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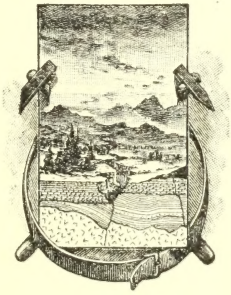
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPERS

Nos. 290-291



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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 290

SURFACE WATER SUPPLY OF THE UNITED STATES

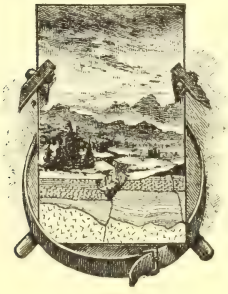
1910

PART X. THE GREAT BASIN

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

E. C. LA RUE, F. F. HENSHAW, AND
E. A. PORTER



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SURFACE WATER SUPPLY OF THE GREAT BASIN, 1910.

By E. C. La Rue, F. F. Henshaw, and E. A. Porter.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of measurements of the flow of certain streams in the United States. The work was performed by the United States Geological Survey, either independently or in cooperation with private or State organizations. The organic law of the Geological Survey (Stat. L., vol. 20, p. 394) contains the following paragraph:

> *Provided,* That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

As water is the most abundant and most valuable of the minerals the investigation of water resources is authorized under the provision for examining mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

The various appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911	150,000

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor are they inclusive of all the streams that might purposefully be studied. The scope of the work is limited by the appropriations available. The field covered is the widest and the character of the work is believed to be the best possible under the controlling conditions. The work would undoubtedly have greater scientific importance and ultimately be of more practical value if the money now expended for wide areas were concentrated on a few small drainage basins; but such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be kept during a period of years long enough to determine within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum. The length of such a period manifestly differs for different streams. Experience has shown that the records for some streams should cover 5 to 10 years, and those for other streams 20 years, or even more, the limit being determined by the relative importance of the stream and the interdependence of the results with other long-time records on adjacent streams.

In the performance of this work an effort is made to reach the highest degree of precision possible with a rational expenditure of time and a judicious expenditure of a small amount of money. In all engineering work there is a point beyond which refinement is needless and wasteful, and this statement applies with especial force to stream-flow measurements. It is confidently believed that the stream-flow data presented in the publications of the Survey are in general sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of stations. All persons are cautioned to exercise the greatest care in using such incomplete records.

Records have been obtained at nearly 2,000 different points in the United States. The surface water supply of small areas in Seward Peninsula and Yukon-Tanana region, Alaska, and in Hawaii has also been investigated. During 1910 regular gaging stations were maintained by the Survey and cooperating organizations at about 1,100 points in the United States, and many discharge measurements were made at other points. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country, and will be made available in the regular surface water-supply papers and in special papers from time to time.

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey have appeared in the annual reports, bulletins, and water-supply papers. Owing to natural processes of evolution and to changes in governmental requirements the character of the work and the territory covered by these different publications have varied greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface-water supply for 1910. The dividing line between the north Atlantic and south Atlantic drainage areas lies between York and James rivers.

Papers on surface-water supply of the United States, 1910.

Part.	No.	Title.
I	281	North Atlantic coast.
II	282	South Atlantic coast and eastern Gulf of Mexico.
III	283	Ohio River basin.
IV	284	St. Lawrence River basin.
V	285	Upper Mississippi River and Hudson Bay basins.
VI	286	Missouri River basin.
VII	287	Lower Mississippi River basin.
VIII	288	Western Gulf of Mexico.
IX	289	Colorado River basin.
X	290	Great Basin.
XI	291	Pacific coast, California.
XII	292	North Pacific coast.

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey, exclusive of special papers:

Stream-flow data in reports of the United States Geological Survey.

[A= Annual Report; B= Bulletin; WS= Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	do	1903.
WS 124 to 135	do	1904.
WS 165 to 178	do	1905.
WS 201 to 214	Complete data, except descriptions	1906.
WS 241 to 252	Complete data	1907–8.
WS 261 to 272	do	1909.
WS 281 to 292	do	1910.

NOTE.—No data regarding stream flow are given in the fifteenth and seventeenth annual reports.

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119.

The first table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1910. Wherever the data for a drainage basin appear in two papers the number of one is placed in parentheses, and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas rivers.

Numbers of water-supply papers containing results of stream measurements, 1899–1910.

	1899 [1]	1900 [2]	1901	1902	1903
Atlantic coast and eastern Gulf of Mexico:					
New England rivers	35	47	65, 75	82	97
Hudson River to Delaware River, inclusive	35	47, (48)	65, 75	82	97
Susquehanna River to York River, inclusive	35	48	65, 75	82	97
James River to Yadkin River, inclusive	(35), 36	48	65, 75	(82), 83	(97), 98
Santee River to Pearl River, inclusive	36	48	65, 75	83	98
St. Lawrence River	36	49	65, 75	(82), 83	97
Hudson Bay			66, 75	85	100
Mississippi River:					
Ohio River	36	48, (49)	65, 75	83	98
Upper Mississippi River	36	49	65, 75	83	98, (99)
Missouri River	(36), 37	49, (50)	66, 75	84	99
Lower Mississippi River	37	50	(65), 66, 75	(83), 84	(98), 99
Western Gulf of Mexico	37	50	66, 75	84	99
Pacific coast and Great Basin:					
Colorado River	(37), 38	50	66, 75	85	100
Great Basin	38, (39)	51	66, 75	85	100
South Pacific coast to Klamath River, inclusive	(38), 39	51	66, 75	85	100
North Pacific coast	38	51	66, 75	85	100

	1904	1905	1906	1907–8	1909	1910
Atlantic coast and eastern Gulf of Mexico:						
New England rivers	124	165	201	241	261	281
Hudson River to Delaware River, inclusive	125	166	202	241	261	281
Susquehanna River to York River, inclusive	126	167	203	241	261	281
James River to Yadkin River, inclusive	126	167	203	242	262	282
Santee River to Pearl River, inclusive	127	168	204	242	262	282
St. Lawrence River	129	170	206	244	264	284
Hudson Bay	130	171	207	245	265	285
Mississippi River:						
Ohio River	128	169	205	243	263	283
Upper Mississippi River	128, (130)	171	207	245	265	285
Missouri River	130, (131)	172	208	246	266	286
Lower Mississippi River	(128), 131	(169), 173	(205), 209	247	267	287
Western Gulf of Mexico	132	174	210	248	268	288
Pacific coast and Great Basin:						
Colorado River	133, (134)	175, (177)	211, (213)	249, (251)	269, (271)	289
Great Basin	133, (134)	176, (177)	212, (213)	250, (251)	270, (271)	290
South Pacific coast to Klamath River, inclusive	134	177	213	251	271	291
North Pacific coast	135	(177), 178	214	252	272	292

[1] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[2] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

Numbers of water-supply papers containing data covering portions of drainage basins.

No.	River basin.	Tributaries included.
35	James	
36	Missouri	Gallatin.
37	Colorado	Green, Gunnison, Grand above junction with Gunnison.
38	Sacramento	Except Kings and Kern.
39	Great Basin	Mohave.
48	Delaware	Wissahickon and Schuylkill.
49	Ohio	Scioto.
50	Missouri	Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte.
65	Lower Mississippi	Yazoo.
82	James	
	St. Lawrence	Lake Ontario, tributaries to St. Lawrence River proper.
83	Lower Mississippi	Yazoo.
97	James	
98	Lower Mississippi	Yazoo.
99	Upper Mississippi	Tributaries from the west.
128	Lower Mississippi	Yazoo.
130	Upper Mississippi	Tributaries from the west.
131	Missouri	Platte, Kans.
134	Colorado	Data near Yuma, Ariz., repeated.
	Great Basin	Susan, Owens, Mohave.
169	Lower Mississippi	Yazoo.
177	Colorado	Below junction with Gila.
	Great Basin	Susan repeated, Owens, Mohave.
	North Pacific coast	Rogue, Umpqua, Siletz.
205	Lower Mississippi	Yazoo, Homochitto.
213	Colorado	Data at Hardyville repeated; at Yuma, Salton Sea.
	Great Basin	Owens, Mohave.
251	Colorado	Yuma and Salton Sea stations repeated.
271	Great Basin	Owens River basin.

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined by measuring or estimating the drainage area; that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. Records for all stations from the source to the mouth of the main stem of the river are presented first, and records for the tributaries in regular order from source to mouth follow, all records in each tributary basin being given before those of the next basin below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated above, and in the records for large lakes, where it is simpler to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, and run-off in inches and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. It is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.
1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.
1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches equals 96.0 Colorado miner's inches.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches equals 104 California miner's inches.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.

1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1½ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each drainage basin there is given a brief general description covering such items as area, source, tributaries, topography, geology, forestation, rainfall, irrigation, storage, power, and other interesting or important facts.

For each regular current-meter gaging station the following data, so far as available, are given: Description of station, list of discharge measurements, table of daily gage heights, table of daily discharges, table of monthly and yearly discharges, and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings

taken each day. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the daily gage heights and daily discharges for the purpose of verifying the published results as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater periods.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The

column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 12, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909." Plate I shows typical gaging stations, indicating the method of suspending the current meter; Plate II shows the various types of current meters [1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are largely compensating, the mean rating curve, when well defined, is much more accurate than the individual measurements. Numerous experiments made to test the accuracy of current-meter work show that it compares very favorably with the results from standard weirs and, owing to simplicity of methods, usually gives results that are much more reliable than those from stations at dams, where the coefficient may be uncertain and conditions of flow are complicated.

The work is, of course, dependent on the reliability of the gage observers. With relatively few exceptions the observers perform their work honestly. The records are, however, closely watched, and the cause of any discrepancy is investigated. It is obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in a period of one month, although a single day's reading may, when taken by itself, be considerably in error.

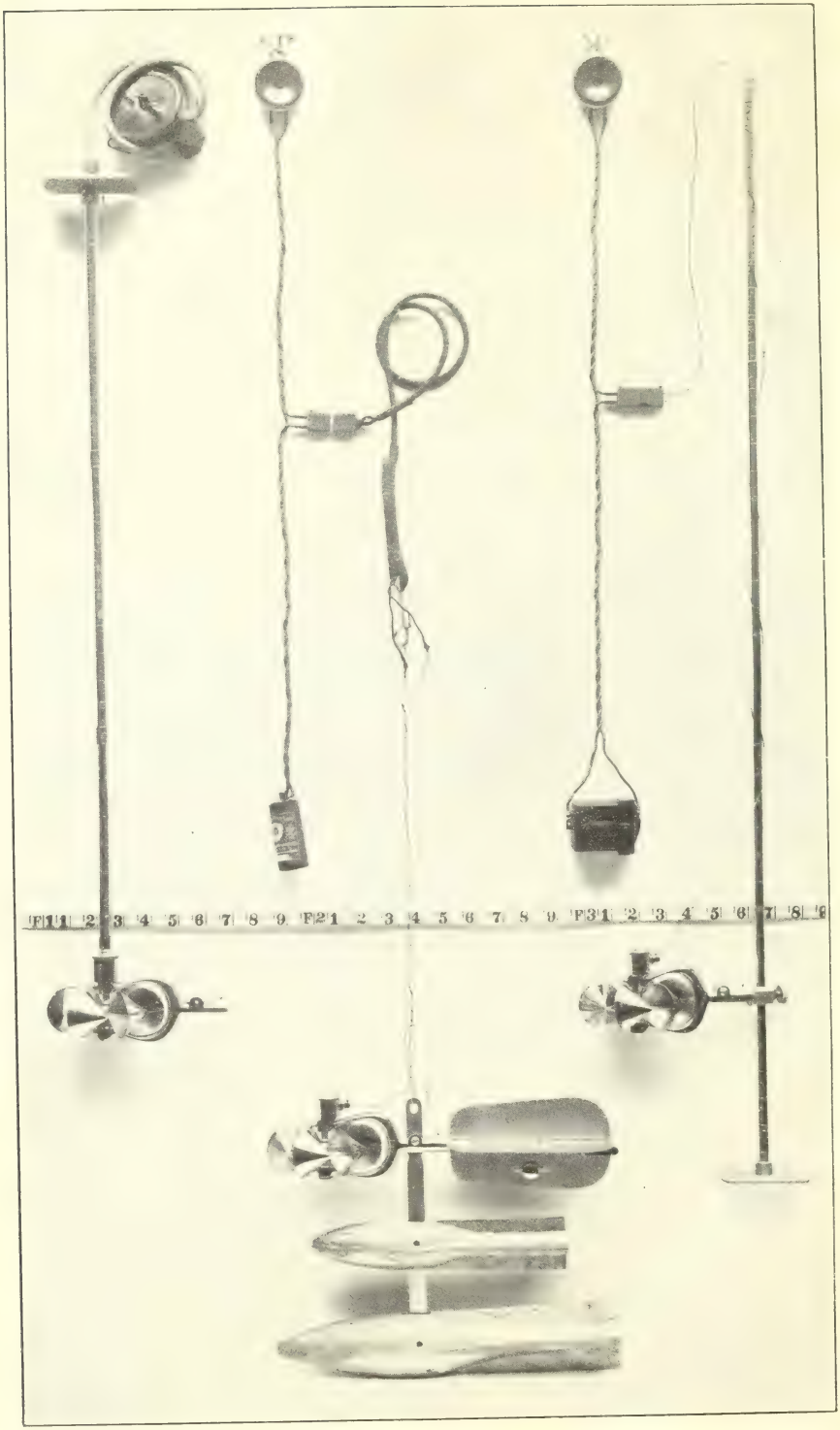
An effort is made to visit every station at least once each year for the purpose of making a measurement to determine the constancy of conditions of flow since the last measurement made in the preceding year, and also to check the elevation of the gage. On account of lack

[1] See Hoyt, J. C., and others, Use and care of current meter as practiced by the United States Geological Survey: Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

A. FOR BRIDGE MEASUREMENT.

B. FOR WADING MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

of funds or for other causes some stations were not visited during the current year. If conditions of flow have been reasonably permanent up to the time of the last preceding measurements, it is considered best to publish estimates of discharge based on the latest verified rating curve rather than to omit them altogether, although it should be distinctly understood that such records are at times subject to considerable error. This is also true, although to a less degree, of the period of records since the date of the last measurement of the current year. As a rule, the accuracy notes are based on the assumption that the rating curve used is strictly applicable to the current year.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

In general, the base data which are collected in the field each year by the Survey engineers are published, not only to comply with the law but also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to year nearly always throw new light on data already collected and published, and hence allow more or less improvement in the computed results of earlier years. It is therefore expected that the engineer who makes serious use of the figures presented in these papers will verify all ratings and make such adjustments for earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for 5 or 10 year periods or more is carried on by the

United States Geological Survey so far as the funds for such work are available.

The estimates in the table of monthly discharge are so arranged as to give only a general idea of the conditions of flow at the station, and it is not expected that they will be used for other than preliminary estimates.

The daily discharges are published to allow a more detailed study of the variation in flow and to determine the periods of deficient flow.

COOPERATIVE DATA.

Cooperative data of various kinds and data regarding the run-off at many stations maintained wholly by private funds are incorporated in the surface water-supply reports of the United States Geological Survey.

Many stations throughout the country are maintained for specific purposes by private parties who supply the records gratuitously to the United States Geological Survey for publication. When such records are furnished by responsible parties and appear to be reasonably accurate, they are verified, so far as possible, and estimated values of accuracy are given. Records clearly worthless or misleading are not published. As it is, however, impossible to completely verify all such records furnished—because of lack of funds or for other causes—they are published for what they are worth, as they are of value as a matter of record and afford at least approximate information regarding stream flow at the particular localities. The Survey does not, however, assume any responsibility for inaccuracies found in such records, although most of them are believed to be reasonably good.

COOPERATION AND ACKNOWLEDGMENTS.

The stream-gaging work in the Great Basin in 1910 has been carried on by the Survey in cooperation with the States of Utah, Nevada, California, Oregon, and Idaho, and with the United States Reclamation Service. Cooperation with the States is effected under contracts which are made between the Director of the Federal Survey and the State engineers or other officials and are authorized by legislative acts appropriating moneys. The State contracts are essentially of the same order, the principal provisions being substantially as follows:

1. The United States Geological Survey retains direct supervision of the field work and the preparation of the data for publication.

2. The Federal Survey retains possession of all material collected—field notes, maps, etc.—but this material is open at all times to inspection by the State officials and if not satisfactory the agreements can be terminated at any time.

3. The salaries of gage observers and the salaries and traveling and field expenses of the engineers are divided between the two parties in some manner agreed upon, the accounts being rendered monthly in accordance with the regulations of the Federal Survey.

4. The streams and localities in which investigations shall be made are determined by conference between the State officials and the representatives of the United States Geological Survey.

5. The cost of publication is borne entirely by the Federal Survey.

The work in Utah is done under a legislative act passed in 1909, providing an annual appropriation of $2,000, contingent on the allotment of an equal amount by the United States Geological Survey, to be expended within the State for the investigation of its water resources.

The legislative act directing the State engineer of Idaho to obtain data on the flow of the streams of the State was also passed in 1909. To carry out the provisions of this act the State engineer was authorized by the State land board to expend the sum of $2,000 on the work if an equal amount was allotted for expenditure by the Federal Survey. The contract made between the Federal Survey and the State in 1909 was renewed for the fiscal year 1910, each party agreeing to allot $5,000 to the work.

State investigation of the water resources of Oregon was authorized by the State legislature in 1905, by an act providing an annual appropriation of $2,500, contingent on the allotment of an equal amount by the United States Geological Survey for similar investigations. A full statement of the method of handling the work and distributing the expenses is published in Water-Supply Paper 292.

The United States Reclamation Service, having under consideration the possibility of developing in the future some irrigation projects in central Oregon, has paid one-half the cost of maintenance of certain stations in the Great Basin for the first half of 1910; for the last half of the year the cost of this work was borne by the Federal Survey and the State.

Special acknowledgments are due to Mr. Caleb Tanner, State engineer of Utah, and to Mr. D. G. Martin, State engineer of Idaho, for assistance rendered the engineers of the Geological Survey.

Acknowledgments are also due to the United States Reclamation Service, which has borne the expense of the work in the Spanish Fork drainage basin in Utah, and in the Carson and Truckee basins in California and Nevada; to the United States Weather Bureau; to the United States Forest Service, which has furnished gage heights for stations in the East Carson, East Walker, and Mono Lake basins; to the engineers of the Los Angeles Aqueduct, who have cooperated in the maintenance of stations in the Owens River basin; to the Stone & Webster Engineering Corporation, of Reno, Nev., which

has furnished records of discharge measurements on streams in the Truckee and Carson River drainage areas; to the Warner Lake Irrigation Co., which has collected and furnished to the Survey data regarding Twentymile Creek and Deep and Honey creeks and their tributaries in Oregon; to the William Hanley Co., which has supplied gage heights on Donner und Blitzen River; to the Silver Valley Irrigation Co., which has cooperated in the maintenance of gaging stations in Harney Valley, Oregon; to G. F. McGonagle, city engineer of Salt Lake City; to the officials of the Telluride Power Co., the Utah Light & Railway Co., the Pacific Reclamation Co., the Vineyard Land & Stock Co., the Muddy Valley Irrigation Co., and other corporations and individuals who have furnished data, cooperated in the maintenance of stations, and rendered valuable assistance in collecting and preparing for publication the data in this volume.

DIVISION OF WORK.

Field data for the Great Basin in Utah, Nevada, and Idaho were collected under the direction of E. C. La Rue, district engineer, assisted by G. C. Baldwin, E. S. Fuller, O. W. Hartwell, A. B. Purton, E. A. Porter, J. C. Dort, G. H. Canfield, and L. Crandall.

Field work in western Nevada was carried on under the direction of W. B. Clapp, district engineer, by T. W. Norcross and H. D. McGlashan; and by F. C. Schafer and D. S. Stuver, under the direction of the project engineer of the United States Reclamation Service. The gage-height records of the Truckee River at Reno were furnished by the United States Weather Bureau, through Mr. H. F. Alps, section director.

Field work in California, except in the Klamath River basin, was carried on under the direction of W. B. Clapp, district engineer, by J. E. Stewart, W. V. Hardy, R. E. Haines, F. G. Wood, G. T. Peekema, H. J. Tompkins, T. W. Norcross, and H. D. McGlashan. Field work in the Klamath River basin was carried on under the direction of W. W. Patch, project engineer, United States Reclamation Service, by G. C. Yadon and Leland Moser.

Field data for the Great Basin in Oregon were collected under the direction of J. C. Stevens and Fred F. Henshaw, district engineers, by L. R. Allen and R. W. Davenport.

The rating curves, special estimates, and studies of the completed data for Nevada stations were made by Fred F. Henshaw and H. D. McGlashan; those for California stations were made by W. B. Clapp and Messrs. Henshaw and McGlashan; those for Oregon were made by Fred F. Henshaw, assisted by E. S. Fuller, F. B. Storey, Howard Kimble, R. W. Davenport, and Charles Leidl.

The data were compiled for publication and computations made under the direction of R. H. Bolster and E. A. Porter, by G. C.

Stevens, R. C. Rice, J. G. Mathers, H. D. Padgett, H. J. Dean, A. H. Tuttle, P. S. Monk, and M. I. Walters.

The entire report was edited by Mrs. B. D. Wood.

GENERAL FEATURES OF THE GREAT BASIN.

The following description of the Great Basin forms part of the introduction to a report on Lake Bonneville, by G. K. Gilbert:[1]

INTERIOR BASINS.

In physical geography the terms "basin" and "drainage district" are synonymous and are used to indicate any area which is a unit as to drainage. The basin of a stream is the tract of country it drains, whether the stream is a great river or the most insignificant tributary to a river. We thus speak of the basin of the Ohio and of the basin of the Mississippi, and say that the latter includes the former. And it may be said in general that the basin of any branching stream includes the basins of all its tributaries.

The basin of a lake is the tract of country of which it receives the drainage, and it includes not only the basins of all affluent streams, but the area of the lake itself. The term "lake basin" is also applied to the depression occupied by the water of a lake and limited by its shores, and where confusion might arise from the double use, the wider sense is usually indicated by the adjective "hydrographic" or its equivalent. If the lake has an outlet its basin is a part of the basin of the effluent stream, but if it has no outlet its basin is complete in itself and is wholly encircled by a line of water parting. In such case it is called a *continental* or *interior* or *closed* or *shut* or *drainless* basin.

If an interior basin exists in a climate so arid that the superficial flow of water, which constitutes drainage, is only potential and not actual, or else is occasional only and not continuous, it contains no perennial lake and is called a dry basin.

The boundaries separating basins are water partings or divides, and these are of all characters, from the acute crests of mountain ranges to low rolls of the plain scarcely discernible by the eye. Interior basins are completely encircled by lines of water parting.

The existence of interior basins depends on two conditions: A suitable topographic configuration and a suitable climate. The ordinary process of land sculpture by running water does not produce cup-like basins, but tends on the contrary to abolish them. Wherever a topographic cup exists the streams flowing toward it deposit within it their loads of detritus, and if they are antagonized by no other agent eventually fill it. If the cup contains a lake, with outlet the outflowing stream erodes the rim of the basin, and eventually the lake is completely drained.

The work of streams occasionally produces topographic cups by the rapid formation of alluvial deposits where two streams meet. If the power of one stream to deposit is greatly increased, or if the power of the other stream to erode is greatly diminished, the one may build a dam athwart the course of the other, and thus produce a lake basin.

The great agent in the production of lake basins, or the agent which has produced most of the large basins, is diastrophism,[2] and in a majority of the cases in which

[1] Gilbert, G. K., Lake Bonneville: Mon. U. S. Geol. Survey, vol. 1, 1890, pp. 2–12; Pl. II. This report is now out of print, but it may be consulted in the libraries of most of the larger cities.

[2] I find it advantageous to follow J. W. Powell in the use of *diastrophism* as a general term for the process or processes of deformation of the earth's crust. The products of diastrophism are continents, plateaus and mountains, ocean beds and valleys, faults and folds. Diastrophism is coordinate with vulcanism, and is the synonym of *displacement* and *dislocation* in the more general of the two geologic meanings acquired by each of those words. Its adjective is *diastrophic*.

basins are partitioned off by the alluvial process just described, the change in the relative power of the streams is brought about by diastrophism.

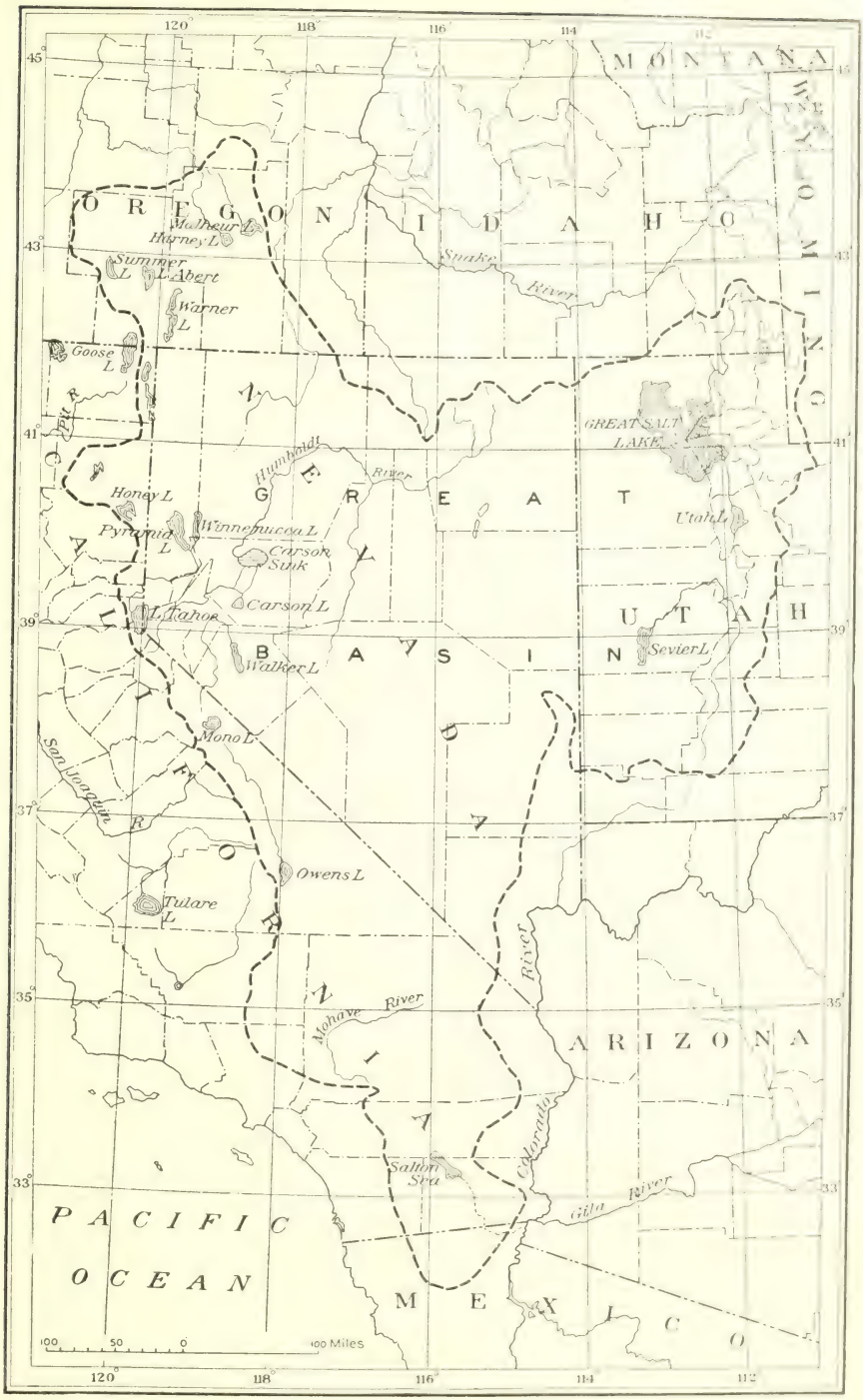
Other basin-forming agencies are volcanic eruption, limestone sinks, wind waves, dunes, landslides, and glaciers. By far the greatest number of topographic cups are due to glaciers; but with these we are not now concerned.

The basins of ordinary lakes are distinguished from interior basins by overflow, and that depends on climate. The rainfall of each basin is or may be disposed of by three processes—first, evaporation from the soil and from the vegetation supported by it; second, evaporation from a lake surface; third, outflow. If the rainfall is sufficiently small, it is all returned to the air by evaporation from the soil and vegetation, and the basin is dry. If it is somewhat larger, the portion not directly evaporated accumulates in the lowest depression, forming a lake, from the surface of which evaporation is more rapid. The area of the lake surface is determined by the area of the basin, the rainfall, and the local rates of evaporation. The basin is closed so long as a lake sufficient for the purpose of evaporation does not require such an extent as to cause it to discharge at the lowest point of the rim. The area inclosed by a contour passing through the lowest point of the rim, the total area of the basin, and the local climate are the three factors which determine whether a given topographic cup shall constitute an interior basin. If the area of a topographic cup and the area of the maximum lake it can contain are nearly identical, it may constitute an interior basin in a region of humid climate. If the contour through the lowest point of the rim incloses an area very small in comparison with the entire basin, the maintenance of an outlet is not inconsistent with an arid climate.

If there were no erosion and sedimentation, unchecked upheaval and subsidence would greatly multiply the number of basins. On the contrary, if all displacement should cease and the foundations of the earth become stable, erosion and sedimentation would merge all basins into one. The actual state of the earth's surface is therefore at once the result and the index of the continuous conflict between subterranean forces on the one hand and atmospheric on the other. The two processes which destroy basins are conditioned by climate. In an arid basin the inwashing of detritus is slow and there is no outflow to corrade the rim; but with abundant rainfall the accumulation of detritus is rapid and corrasion conspires with it to diminish the inequality between center and rim. In arid regions, therefore, the formative subterranean forces are usually victorious in their conflict with the destructive atmospheric forces, and as a result closed basins abound; in humid regions the destructive agencies prevail and lake basins are rare. In the present geologic age it is necessary to restrict this generalization to lands in the lower latitudes, because the glaciation of the last geologic period created an immense number of lake basins in humid regions of high latitude, and running water has as yet made little progress in their destruction.

THE GREAT BASIN.

The major part of the North American continent is drained by streams flowing to the ocean, but there are a few restricted areas having no outward drainage. The largest of these was called by Fremont, who first achieved an adequate conception of its character and extent, the "Great Basin," and is still universally known by that name. It is not, as the title might suggest, a single cup-shaped depression gathering its waters at a common center, but a broad area of varied surface, naturally divided into a large number of independent drainage districts. It lies near the western margin of the continent and is embraced by rivers tributary to the Pacific Ocean. On the north it is bounded by the drainage basin of the Columbia, on the east by that of the Colorado of the West, and on the west by the basins of the San Joaquin, the Sacramento, and numerous minor streams. The central portion of the western water parting is the crest of the Sierra Nevada, one of the greatest mountain masses of the United States, and farther south high mountains constitute much of the



SKETCH MAP OF THE GREAT BASIN.

boundary. The northern half of the eastern boundary is likewise high, winding through the region of the High Plateaus. The remainder of the boundary does not follow any continuous line of upland, but crosses mountain ranges and the intervening valleys without being itself marked by any conspicuous elevations. It is defined only through a study of the drainage. The general form of the area [Pl. III] is rudely triangular, with the most acute angle southward. The extreme length in a direction somewhat west of north and east of south is about 880 miles, the extreme breadth from east to west, in latitude 40° 30′, is 572 miles, and the total area is approximately 210,000 square miles. Of political divisions it includes nearly the whole of Nevada, the western half of Utah, a strip along the eastern border of California and a large area in the southern part of the State, another large area in southeastern Oregon, and smaller portions of southeastern Idaho and southwestern Wyoming. The southern apex extends into the territory of Mexico at the head of the peninsula of Lower California.

The region is occupied by a number of mountain ridges which betray system by their parallelism and by their agreement in a peculiar structure. Their general trend is northerly, inclining eastward in the northern part of the basin and westward at the south. The individual ridges are usually not of great length, and they are so disposed en échelon that the traveler winding among them may traverse the basin from east to west without crossing a mountain pass. The type of structure is that of the faulted monocline, in which the mountain ridge is produced by the uptilting of an orogenic block from one side of a line of fracture, and it has been named (from the region) the Basin Range type. Its distribution, however, does not coincide perfectly with the district of interior drainage. On the one hand the Great Basin includes along its eastern margin a portion of the Plateau province, with its peculiar structural type, and on the other the Basin Range province extends southward through Arizona to New Mexico and Mexico.

Between the ranges are smooth valleys, whose alluvial slopes and floors are built of the débris washed through many ages from the mountains. In general they are troughlike, but in places they coalesce and assume the character of plains. The plains occupy in general the less elevated regions, where an exceptional amount of detritus has been accumulated. In local terminology they are called deserts. The largest are the Great Salt Lake and Carson deserts at the north and the Mojave and Colorado deserts at the south. The Escalante, the Sevier, the Amargosa, and the Ralston are of subordinate importance.

Where the basin is broadest, the general elevation of its lowlands is about 5,000 feet, but they are somewhat higher midway between the eastern and western margins, so as to separate two areas of relative depression, the eastern marked by the Great Salt Lake and Sevier deserts, and the western by the Carson Desert. Southward there is a gradual and irregular descent to about sea level, and limited areas in Death Valley and Coahuila Valley lie lower than the surface of the ocean.

The aridity of the region is shown instrumentally by the records of rainfall and atmospheric humidity. On the broad plain bounded east and west by the Appalachian Mountains and the Mississippi River, 43 inches of rain falls in a year. On the lowlands of the Great Basin there falls but 7 inches. In the former region the average moisture content of the air is 69 per cent of that necessary for saturation; in the lowlands of the Great Basin it is 45 per cent.[1] From the surface of Lake Michigan evaporation removes each year a layer of water 22 inches deep.[2] The writer has estimated that

[1] These figures and those in the preceding sentences are based on data compiled by the United States Signal Service. Through the courtesy of Gen. A. W. Greely, Chief Signal Officer, the writer has had access to manuscript as well as printed data.

[2] D. Farrand Henry, in a report on the meteorology of the Laurentian lakes (Rept. Chief Eng. for 1868, Washington, 1869, p. 980).

80 inches are yearly thus removed from Great Salt Lake,[1] and Mr. Thomas Russell has computed from annual means of temperature, vapor tension, and wind velocity that in the lowlands of the Great Basin the annual rate of evaporation from water surfaces ranges from 60 inches at the north to 150 inches at the south.[2]

The variation with latitude exhibited by the evaporation is found also, inversely, in the rainfall, but it is not clearly apparent in the humidity. In the southern third of the Basin the lowland rainfall ranges from 2 to 5 inches. On the line of the Central Pacific Railroad, between the fortieth and forty-second parallels, it averages 7 inches; on the Oregonian arm at the north, 15 inches. The average lowland precipitation for the whole area is between 6 and 7 inches. With the relative humidity approximately constant, the evaporation rate varies directly and the rainfall inversely with the temperature, and both latitude and altitude here make the lowland temperature fall toward the north. The sympathy of rainfall with temperature is likewise shown in the greater precipitation of the mountains as compared with adjacent valleys. Mountain stations proper are wanting, but rain-gage records on the flanks and in the passes of mountains show a marked advantage over those in neighboring lowlands. An estimate based on these, on the records at high points in the Sierra Nevada, and on approximate knowledge of the heights and areas of the mountains and plateaus of the Great Basin, places the average precipitation for the whole district at 10 inches.

The story of climate is more eloquently told by the hydrography and the vegetation. In the valleys of the northwestern arm of the basin there are numerous lakes, drainless and of varying extent, but fed by streams from mountain ranges of moderate size. In the middle region the only perennial lakes are associated with mountain masses of the first rank. The great Sierra forming the western wall of the Basin receives each winter a heavy coating of snow—the greater part on the side of the great California valley, but enough east of the water parting to maintain a line of lakes in the marginal valleys of the Great Basin. The Wasatch Range and its associated plateaus, overlooking the Basin from the east, are less favored than the Sierra, but still receive an important precipitation, and by gathering the drainage from a large area support Great Salt Lake, the largest of the Basin's water sheets. The East Humboldt Range, standing midway, and one of the largest mountain masses within the Basin area, catches enough moisture to feed at one base two small lakes and at the other the Humboldt River. The neighboring and smaller mountains are whitened every winter by snow, a large share of which either evaporates without melting or, if melted, is absorbed by the soil, to be returned to the thirsty air without gathering in drainage ways. Many of them are without perennial streams; some even lack springs; and of the mountain creeks few are strong enough to reach the valleys before succumbing to the ravenous desert air. The Humboldt itself, though fairly entitled to the name of river, dwindles as it goes, so that its remnant after a course of 200 miles is able to sustain an evaporation lake barely 25 square miles in extent. Most of the small closed basins are without permanent creek or lake, containing at the lowest point a playa or "alkali flat"—a bare, level floor or fine saline earth, or perhaps of salt, over which a few inches of water gather in times of storm.

In the southern half of the Basin there are no lakes dependent for their water on the interior ranges. At the east the most southerly lake is Sevier, in latitude 39°; the last of the lakes sustained by the Sierra is Owens, between the thirty-sixth and thirty-seventh parallels. Then for 300 miles evaporation is supreme. Playas abound, streams are almost unknown, and springs are rare. Death Valley, with its floor of salt spread lower than the surface of the ocean, is overlooked on either side by mountains from 5,000 to 10,000 feet high, but they yield it no flowing stream, and more than one traveler has perished from thirst while endeavoring to pass from spring to spring.

[1] Report on the lands of the arid region, * * * J. W. Powell, 2d ed., Washington, 1879, p. 73.
[2] Manuscript report to the Chief Signal Officer.

The Mojave "river" is 100 miles long, but it preserves its life only by concealment, creeping through the gravel of the desert and betraying its existence only where ledges of rock athwart its course force it to the surface.

As in other desert regions, precipitation here results only from cyclonic disturbance, either broad or local, is extremely irregular, and is often violent. Sooner or later the "cloud-burst" visits every tract, and when it comes the local drainage way discharges in a few hours more water than is yielded to it by the ordinary precipitation of many years. The deluge scours out a channel which is far too deep and broad for ordinary needs and which centuries may not suffice to efface. The abundance of these trenches, in various stages of obliteration but all manifestly unsuited to the every-day conditions of the country, has naturally led many to believe that an age of excessive rainfall has but just ceased—an opinion not rarely advanced by travelers in other arid regions. So far as may be judged from the size of the channels draining small catchment basins, the rare, brief, paroxysmal precipitation of the desert is at least equal while it lasts to the rainfall of the fertile plain.

A line of cottonwoods marks the course of each living stream, but otherwise the lowlands are treeless. So are most of the alluvial foot slopes and some of the smaller mountains, especially at the south. Except on the high plateaus in central Utah, there is little that may be called forest. The greater mountains have much timber in their recesses, but are not clothed with trees. The growth is so irregular and interrupted that the idea of a tree limit could not have originated here, but it may be said that only the straggling bush-like cedar passes below 6,000 feet at the north or 7,000 feet at the south. Only conifers are of such size and abundance as to have economic importance. Oak and maple grow commonly as bushes, forming low thickets, but occasionally rank as small trees, along with the rarer box elder, ash, locust, and hackberry. The characteristic covering of the lowlands is a sparse growth of low bushes, between which the earth is bare, excepting scattered tufts of grass. Toward the north, and especially on the higher plains, the grass is naturally more abundant and the bushes occupy less space, but the introduction of domestic herds favors the ascendency of the bushes. At the south the bushes are partly of different species, and they are partially replaced by cactuses and other thorny plants. The playas are bare of all vegetation and are usually margined by a growth of salt-loving shrubs and grasses. A single southern bush bears leaves of deep green, but with this exception the desert plants are grey, like the desert soil. These, and the persistent haze whose grey veil deadens all the landscape, weary the eye with their monotony, so that the vivid green marking the distant spring is welcome for its own sake as well as for the promise of refreshment to the thirsty traveler.

The causes of this arid climate lie in the general circulation of the atmosphere, in the currents of the Pacific Ocean, and in the configuration of the land. There is a slow aerial drift from west to east, so that the air coming to the Basin has previously traversed a portion of the Pacific, to which its temperature and humidity have become adjusted. Off the west coast of the United States there is a southward current believed to be the chief branch of the Kuro Siwa. Prof. George Davidson[1] estimates its width at about 300 miles, and finds that its temperature rises with southward advance only 1° Fahrenheit for each degree of latitude. Being derived from a north-moving current, it reaches our coast with a temperature higher than that normal to the latitude, while at the south its temperature is below the normal. As pointed out by Dutton,[2] the air passing from it to the land at the north is cooled by the land and precipitates moisture, while the similar air current at the south is warmed by the land and converted to a drying wind. The Great Basin falls within the influence of the drying

[1] Letter to the writer.

[2] Dutton, C. E., Cause of the arid climate of the western portion of the United States: Am. Jour. Sci., 3d ser., vol. 22, p. 249.

wind, its southern part being more affected than its northern. At the extreme south and the extreme north the mountains between the ocean and the Basin do not greatly interfere with the eastward flow of air, but between latitudes 35° and 41° the Sierra Nevada forms a continuous wall rarely less than 10,000 feet high. In rising to pass this obstruction the air loses much of its stored moisture, especially in winter, and it descends to the Basin with diminished humidity. The Basin is further influenced by deviations of the air currents from the eastward direction, and its southern part falls in summer within the zone of calms theoretically due to a descending current at the margin of the northern trade wind; but observational data are too meager for the discussion of these factors.

OTHER INTERIOR BASINS.

The southern portions of Arizona and New Mexico and the western part of Texas resemble the Great Basin in climate, and they contain a number of small interior basins. These are not so fully determined in extent as the Great Basin, but several of them may be approximately indicated. One of the largest lies between the Rio Grande and its eastern branch, the Pecos, extending from latitude 35° in central New Mexico to latitude 31° in western Texas. In its broadest part it is bounded on the west by the San Andreas and Organ Mountains, and on the east by the Sacramento and Guadalupe. Its area, of which two-thirds lies in New Mexico, is about 12,500 square miles. Southwest of the Rio Grande, in Mexico, there is a larger tract of interior drainage, containing a number of saline lakes, and to one of these, Lake Guzman, the valley of the Mimbres River of New Mexico descends. Other basins adjacent on either side to that of the Mimbres are believed to bear the same relation to Lake Guzman, sloping gently toward it but contributing no water unless during periods of rare and exceptional storm. Yet other basins without exterior drainage are contiguous to these, and unite to form in southwestern New Mexico an arm of the Mexican district of interior drainage, the area within New Mexico probably falling between 7,000 and 7,500 square miles. North of this, and intersected centrally by the one hundred and third meridian and the thirty-fourth parallel, lies a smaller basin, including the plain of San Augustin. Its area is about 1,800 square miles. In southeastern Arizona a slightly smaller basin lies between the Caliyuro and Dragoon Mountains on the west and the Pinaleño and Chiricahua Mountains on the east, including the Playa de los Pimas. Another and still smaller basin is known to exist in the Hualpai Valley of northwestern Arizona, and it is probable that others occur in the western part of the Territory, both north and south of the Gila River. When all have been determined and measured, it is estimated that the total area of the interior basins of the United States, additional to the Great Basin, will be found to equal 25,000 square miles, making the grand total for the United States about 232,000 square miles—the thirteenth part of our territory. Mexico contains other inland districts besides the one mentioned above, and the total area in that country may be one-third as great as ours. It is probable that the remainder of the continent drains to the ocean.

Large as are these districts, it is nevertheless true that North America, as compared with other continents, is not characterized by interior drainage. According to data compiled by Murray, the closed basins in Australia aggregate 52 per cent of its area, those of Africa 31 per cent, of Eurasia 28 per cent, of South America 7.2 per cent, of North America 3.2 per cent.[1] The Great Basin is great only in comparison with similar districts of our own continent. The interior district of the Argentine Republic and Bolivia is half as large again, and that of central Australia exceeds the Great Basin seven times; Sahara exceeds it sixteen times, and the interior district of Asia twenty-three times.

[1] Murray, John, The total annual rainfall of the land of the globe, and the relation of rainfall to the annual discharge of rivers: Scottish Geog. Mag., vol. 3, pp. 65–77.

GREAT SALT LAKE BASIN.

GENERAL FEATURES.[1]

Great Salt Lake, the largest inland body of water in the United States, is situated in the north-central part of Utah, in the eastern part of the Great Basin, near the west base of the Wasatch Mountains. Its hydrographic basin, 54,000 square miles in area, shows two widely contrasted topographic types. The eastern portion is mountainous and contains peaks rising 12,000 feet above sea level or 8,000 feet above the lake; the western portion is composed of desert valleys, elevated but little above the lake surface, and separated from adjacent valleys by narrow, abrupt, desert ranges one to two thousand feet or more higher than the intervening plains.

The shores of the lake are low, except at a point on the north, where a projecting mountain spur forms a rocky promontory, and for a short distance along the south shore, where it touches the north end of the Oquirrh Mountains. Its surface is broken by several islands, two of which rise, rugged and precipitous, more than a thousand feet above the water and are made up of the short mountain ranges of the type so characteristic of the Great Basin. The saline and alkaline shores are mud plains, either naked and frequently white with drifting salts or scantily clothed with desert shrubs. The monotony caused by the absence of conspicuous flowers is in many places relieved by broad areas covered with a peculiar plant known as Salicornia, which grows in fleshy stems, without leaves, and looks not unlike branching coral, a resemblance that is heightened by its many shades of red, pink, and yellow.

The streams feeding the lake, of which Bear, Weber, and Jordan rivers are the most important, rise in the high mountains to the east and carry water so clear and sweet that only chemical tests reveal the presence of the mineral matter it has dissolved from the rocks and soils. About the lake or rising beneath its surface are a number of fissure springs, some of which supply hot water and contain more saline matter in solution than is usually found in surface streams, but with a single known exception none of the small springs are markedly saline. The salts they contain are acquired largely during the upward passage of the water through the sediment of former lakes, and their influence on the chemistry of the present lake water is important. It is believed, however, that the combined volumes of the streams and springs now tributary to the lake, if not concentrated by evaporation, would form a water body in which no trace of saline matter would be perceptible to the taste.

The waters of the lake during recent low stages have become nearly saturated with sodium chloride and sodium sulphate, and under cer-

[1] Abstracted from Russell, I. C., Lakes of North America, Boston, 1895, pp. 77–83.

tain conditions these salts are precipitated. Along the margin of the lake, where the water is only a few inches deep, it becomes so concentrated by evaporation that common salt crystallizes and forms brilliant white layers on the bottom. The quantity of common salt held in the water of the lake is estimated at 400,000,000 tons and the sodium sulphate at 30,000,000 tons. The separation of the common salt forms an important industry. The solubility of sodium sulphate is controlled largely by temperature. In Great Salt Lake in summer it is all dissolved and the waters are clear, but as cold weather approaches it separates and renders the waters opalescent and somewhat milky in color. In the depth of winter, when the temperature falls below zero of the Fahrenheit scale, as it does at times for many days together, this salt separates and is thrown to the shore by the waves in hundreds of tons, forming a slushlike mass on the beach looking like soft snow. On such occasions it can be gathered in practically unlimited quantities, but it is soon redissolved when the temperature rises. The brine of the lake is so concentrated that fish can not live in it, but it furnishes a congenial home for small crustaceans known as brine shrimps and for the larvæ of dipterous insects.

The area of the lake and the elevation of its surface vary somewhat from year to year and from season to season, partly as a result of climatic changes and partly because of human interference with the flow of the streams that supply the water. A map made from surveys under Lieut. Stansbury, in 1850, represents it as having an area of about 1,750 square miles. A second map, made in connection with the Fortieth Parallel Survey, in charge of Clarence King, in 1869, shows an area of 2,170 square miles. Its present area (1912) is about 1,800 square miles. In 1850 the maximum depth of the water was about 36 feet and the average depth about 13 feet; in 1869 the maximum depth was 49 feet, and the average about 19 feet; its present maximum depth is estimated at 40 feet.

The annual high-water stage of the lake occurs in June and is due to the melting of the snow on the Wasatch and Uinta Mountains. The annual and secular fluctuations of the lake have been carefully recorded since 1875.[1]

BEAR RIVER BASIN.

GENERAL FEATURES.

Bear River rises on the northern slope of the Uinta Mountains, in the northeastern part of Utah, and after a circuitous course—in which it leaves Utah and enters Wyoming, reenters Utah, appears again in Wyoming, and makes a long detour in Idaho—it returns to

[1] The records of these changes to 1890 and their significance are discussed by G. K. Gilbert in Mon. U. S. Geol. Survey, vol. 1, 1890.

Utah and finally discharges its waters to Great Salt Lake. The maximum elevation of the upper rim of the basin is 13,000 feet above sea level.

The upper part of the basin comprises a rough, broken country, well drained by numerous short streams, most of which are confined to steep, narrow canyons. The streams are fed by many small springs and by the melting of the snow which forms the greater part of the precipitation. The rocks of the extreme headwater region are chiefly sandstones and quartzites and are covered with a thin layer of soil which supports scattered groves of fir and aspen. A few small lakes lie near the head of the river.

Just below Dingle the main stream passes through the north end of Bear Lake valley in a well-defined channel, and from this point to Preston it occupies a steep-walled canyon, broken here and there by short, narrow valleys containing irrigated farms. The tributaries in this stretch are few, the most important being Mink and Cottonwood creeks. About 10 miles below Dingle the river receives the outlet of Bear Lake, a small, crooked, sluggish stream that discharges but little water at any time, though it is the only visible outlet of a water body about 144 square miles in area. There is no storage on the main stream, but on Mink Creek a number of small storage reservoirs are contemplated or in process of construction, the water to be diverted for the irrigation of lands in the northwest end of Cache Valley.

Between Preston and the lower end of Cache Valley the Bear flows sluggishly along the west side of its basin in a well-defined channel, and during extreme floods it overflows slightly and covers a very narrow strip immediately along the river. The principal tributaries in this stretch are Cub Creek and Logan River.

Cub Creek rises in the Bear River Range and flows through a steep, narrow canyon in a rough limestone country until it reaches Cache Valley, which it crosses in a winding but well-defined channel to its junction with the Bear.

Logan River rises on the west slope of the Bear River Range, flows southwest and then northwest, and unites with the Bear near Benson, Utah. Its basin is rough and rugged, elevations ranging from 4,500 to 9,000 feet above sea level and the river being confined largely to a steep, rough channel in a comparatively narrow canyon. Probably three-fourths of the precipitation in this basin is snow, the melting of which supplies the principal part of the spring and summer flow; the late summer and winter flow is derived chiefly from springs which are well distributed over the basin. In its upper course the Logan receives many short, swift tributaries. Temple Fork and South Fork, which enter, respectively, 10 miles and 15 miles above Logan, are perennial streams and furnish one-third to one-fourth of the total flow. Blacksmith Fork comes in below Logan. The entire flow of

this river, after being used to develop power at two electric plants near the mouth of the canyon, is diverted for irrigation. None of the run-off is stored at present.

Practically the only inflow to the Bear in Cache Valley is from seepage and springs. The lower portions of the valley form an artesian basin containing numerous small, flowing wells. The water table lies very near the surface, and during the early spring the lower lands are largely swamp.

The Bear River Canal Co. diverts practically the entire summer flow of the stream above Collinston to agricultural lands lying on both sides of the river below Bear River canyon. This system has a capacity of 1,000 second-feet, and during the winter and flood seasons a part of the water is used to develop electric power at a point about one-fourth mile above the Collinston station and is returned to the river at Collinston. From 10 to 30 second-feet reaches the stream through leaks and as seepage from the diversion canals.

Owing to the complete control of the stream by irrigation works, the discharge is liable to extreme variation at any period.

Within the periods for which records are available the wettest year was 1907, the run-off at Collinston in the year being 2,680,000 acre-feet; in 1890, 1894, 1897, 1899, and 1909 the run-off was also high, the total for each of these years exceeding 2,000,000 acre-feet. The driest year was 1905, when the run-off at Collinston, Utah, was only 701,000 acre-feet.

BEAR RIVER AT DINGLE, IDAHO.

This station, which is located in a cut-off built by the Oregon Short Line Railroad Co., one-fourth mile east of Dingle railroad station, about 10 miles above the outlet of Bear Lake, below the proposed intake of the diversion canal to the lake, was established May 9, 1903. Some water is diverted for irrigation above this point.

The gage is an inclined staff, and its datum has remained unchanged since the station was established.

Discharge measurements are made from a car and cable near the gage.

The records at this station are not affected by artificial control of flow above or below. The river is usually frozen over from December to March, the ice reaching a thickness of 14 to 15 inches. The ice cover is, however, smooth, no anchor or needle ice ever having been known to form.

Conditions during the open-water season favor the accurate determination of discharge at this station; and as approximate estimates of the flow under ice have been made, the records as a whole may be considered good.

Discharge measurements of Bear River at Dingle, Idaho, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 22	O. W. Hartwell	119	493	6.05	1,340
Sept. 1	L. Crandall	105	175	3.32	109
23	do	107	185	3.43	134
23	do	107	185	3.43	135

Daily gage height, in feet, of Bear River at Dingle, Idaho, for 1910.

[M. K. Hopkins, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.9			5.55	6.85	4.9	3.7				3.6	
2		4.9	5.0		6.8			3.35	3.3	3.55		3.7
3	5.0			5.5		4.9	3.65				3.6	
4		4.8	5.7	5.45	6.7				3.35	3.55		3.8
5	5.15		6.2	5.4	6.55	4.95	3.7				3.6	
6		4.8	6.7	5.4				3.25		3.6	3.6	4.1
7			6.15	5.4	6.2		3.65		3.35	3.55		
8	5.1			5.4	6.1	5.0		3.2	3.35		3.6	
9		4.8	7.3	5.4			3.6			3.55		
10	5.15			5.5	6.0	4.85					3.6	3.7
11			9.2	5.6		4.8		3.2	3.35	3.6		
12	5.15	4.8		5.65	6.1	4.8	3.6			3.5	3.7	3.7
13		4.8	8.7	5.7	6.1	4.75		3.2			3.7	
14			8.3	5.8	6.1	4.7	3.6	3.2	3.4	3.6	3.7	
15	5.0		7.7	5.9	6.15		3.6					3.65
16	5.0	4.8	6.7	5.9			3.6	3.15		3.6	3.7	
17			6.6	5.85	6.2	4.4	3.6	3.1	3.4			3.6
18	5.1		6.5	5.8				3.1	3.5	3.65	3.6	3.9
19		4.8	6.5	5.8	5.9	4.3	3.55					
20	5.1		6.5	5.85				3.1	3.5	3.7	3.65	
21		4.8	6.6		5.4	4.15						
22	5.1		6.6	6.05	5.2		3.6	3.15			3.65	4.1
23		4.8	6.6	6.15		3.9				3.6		
24	5.15		6.6	6.3	5.1		3.55	3.1	3.4		3.8	3.7
25		4.8	6.4	6.45		3.9	3.5	3.1	3.4	3.6		3.7
26					5.0				3.4		3.75	
27	5.0	4.8	6.2	6.6	5.0	3.8		3.1		3.6	3.75	3.6
28			6.0	6.65			3.5	3.2				
29	5.0		5.8	6.75	4.9	3.8		3.3	3.5	3.6		3.7
30			5.7	6.85		3.7	3.45		3.5	3.6	3.8	
31	4.9		5.6				3.4	3.3				3.6

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 15 and during the greater part of December. Ice gorge about Mar. 11 to 15.

Daily discharge, in second-feet, of Bear River at Dingle, Idaho, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				1,060	2,150	690	200	122	106	156	174	
2				1,040	2,100	690	194	117	106	162	174	
3				1,020	2,050	690	187	112	112	162	174	
4				990	2,000	700	194	106	117	162	174	
5				960	1,860	715	200	101	117	168	174	
6				960	1,700	725	194	96	117	174	174	
7				960	1,550	735	187	91	117	162	174	
8				960	1,470	740	180	86	117	162	174	
9				960	1,430	700	174	86	117	162	174	
10				1,020	1,390	665	174	86	117	168	174	
11				1,090	1,430	640	174	86	117	174	186	
12				1,120	1,470	640	174	86	120	150	200	
13				1,160	1,470	617	174	86	124	162	200	
14				1,230	1,470	594	174	86	128	174	200	
15				1,310	1,510	482	174	81	128	174	200	
16			2,000	1,310	1,530	468	174	76	128	174	200	
17			1,910	1,270	1,550	456	174	66	128	180	186	
18			1,820	1,230	1,430	430	168	66	150	187	174	
19			1,820	1,230	1,310	414	162	66	150	194	180	
20			1,820	1,270	1,140	384	166	66	150	200	187	
21			1,910	1,350	960	355	170	71	145	192	187	
22			1,910	1,430	840	310	174	76	138	182	187	
23			1,910	1,510	815	264	168	71	134	174	208	
24			1,910	1,640	790	264	162	66	128	174	230	
25			1,730	1,780	765	264	150	66	128	174	222	
26			1,640	1,840	740	247	150	66	128	174	215	
27			1,550	1,910	740	230	150	66	135	174	215	
28			1,390	1,960	715	230	150	86	142	174	220	
29			1,230	2,050	690	230	144	106	150	174	225	
30			1,160	2,150	690	200	139	106	150	174	230	
31			1,090		690		128	106		174		

NOTE.—Daily discharge determined from a discharge rating curve well defined above 100 second-feet. Discharge interpolated for days for which gage heights are missing during the period of open water.

Monthly discharge of Bear River at Dingle, Idaho, for 1910.

[Drainage area, 2,890 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			250	0.087	0.10	14,900	D.
February			210	.073	.08	11,700	D.
March			1,380	.478	.55	84,800	C.
April	2,150	960	1,330	.460	.51	76,500	A.
May	2,150	690	1,300	.450	.52	77,400	A.
June	740	200	493	.171	.19	28,400	B.
July	200	128	172	.060	.07	10,200	A.
August	122	66	86	.030	.03	5,120	B.
September	150	106	128	.044	.05	7,360	A.
October	200	150	172	.060	.07	10,200	A.
November	230	174	193	.067	.07	11,100	A.
December			190	.066	.08	11,300	C.
The period		66	494	.171	2.32	349,000	

NOTE.—Discharge Jan. 1 to Mar. 15 and Dec. 1 to 31 estimated from the discharge at Preston, climatological records, and observer's notes in regard to ice. A heavy rainstorm in Idaho during the early part of March caused premature melting of the accumulated snows in the mountains and high run-off. Mean discharge Mar. 1 to 15 estimated at 1,060 second-feet.

BEAR RIVER NEAR PRESTON, IDAHO.

This station, which is located just below the wagon bridge on the road from Preston to Battle Creek, at a point about 4½ miles northwest of Preston, Idaho, and about 10 miles north of the Idaho-Utah State line, was established October 11, 1889. The records show practically the amount of water passing from Idaho into Utah and will be of value in the final adjudication of water rights.

No important tributaries enter above the station; Battle Creek comes in a few hundred feet below the station. Although the river passes through large areas of irrigable land, no important diversions are at present made above this point.

The river freezes over at the section and the flow is affected by slush ice. On December 10, 1909, a heavy landslide obstructed the channel, and the relation of gage height to discharge from that date to about the end of March, 1910, is uncertain. From the latter part of March to the end of 1910 the conditions of flow were very stable.

A new gage was installed April 3, 1909, at a point about 200 feet below the old gage; it reads 0.05 foot lower than the old gage. The new curve was found to be parallel to the old curve, and the gage heights taken during 1909 previous to the establishment of the new gage were referred to the new gage datum.

Discharge measurements are made from a cable and car above the new gage and about 300 feet below the bridge.

Discharge measurements of Bear River near Preston, Idaho, 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 23	O. W. Hartwell	207	601	3.89	2,900
May 31	do	133	458	2.89	1,540
July 29	do	125	264	1.46	317
29	do	125	264	1.47	333
Sept. 3	L. Crandall	127	289	1.59	387
Dec. 9	J. C. Dort	129	343	2.10	699

Daily gage height, in feet, of Bear River near Preston, Idaho, for 1910.

[O. M. Seamons, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	2.0	2.25	4.0	4.2	2.8	1.5	1.45	1.5	1.8	2.05	2.2
2	2.85	2.0	2.55	3.9	4.2	2.75	1.45	1.45	1.5	1.85	2.0	2.2
3	2.55	2.0	2.7	3.85	4.2	2.7	1.45	1.4	1.55	1.95	2.1	2.25
4	2.35	2.0	2.8	3.8	4.2	2.7	1.45	1.4	1.7	1.9	2.1	2.2
5	2.5	2.05	2.95	3.7	4.1	2.65	1.4	1.4	1.7	1.9	2.1	2.2
6	2.7	2.1	2.9	3.7	4.2	2.6	1.4	1.4	1.7	1.9	2.1	2.2
7	2.8	2.0	3.1	3.7	4.1	2.6	1.4	1.4	1.7	1.9	2.0	2.15
8	2.85	2.0	3.15	3.7	4.0	2.6	1.4	1.35	1.7	1.9	2.0	2.15
9	2.85	2.0	3.3	3.7	4.0	2.55	1.4	1.3	1.7	1.9	2.0	2.15
10	2.9	2.0	3.3	3.7	4.0	2.5	1.35	1.3	1.7	1.9	2.0	2.2
11	2.9	2.0	3.5	3.7	4.0	2.5	1.35	1.35	1.7	1.9	2.0	2.2
12	2.9	2.0	3.9	3.8	4.0	2.45	1.3	1.5	1.7	1.9	2.0	2.2
13	2.9	2.0	4.5	3.75	3.95	2.4	1.3	1.5	1.7	1.9	2.05	2.2
14	2.95	2.0	5.5	3.75	3.9	2.4	1.3	1.45	1.7	1.9	2.05	2.15
15	2.55	2.0	5.9	3.75	3.85	2.4	1.3	1.4	1.7	2.0	2.05	2.05
16	2.2	2.0	5.85	3.75	3.8	2.4	1.3	1.4	1.7	2.0	2.05	2.0
17	2.2	2.0	5.75	3.8	3.7	2.35	1.4	1.4	1.75	2.1	2.1	2.0
18	2.2	2.0	5.45	3.8	3.7	2.3	1.45	1.5	1.75	2.1	2.1	2.0
19	2.2	2.0	5.15	3.85	3.65	2.25	1.4	1.5	1.75	2.2	2.1	2.0
20	2.2	2.0	5.05	3.85	3.6	2.2	1.4	1.4	1.75	2.0	2.1	2.0
21	2.2	2.0	4.9	3.9	3.55	2.1	1.4	1.4	1.75	2.05	2.1	2.1
22	2.2	2.0	4.85	3.9	3.5	1.95	1.4	1.45	1.75	2.0	2.1	2.1
23	2.1	2.0	4.7	3.9	3.45	1.9	1.4	1.45	1.7	2.0	2.15	2.1
24	2.1	2.0	4.6	3.9	3.4	1.85	1.4	1.45	1.7	2.0	2.15	2.1
25	2.1	2.0	4.6	3.9	3.35	1.8	1.45	1.45	1.75	2.0	2.2	2.1
26	2.1	2.0	4.5	4.0	3.2	1.75	1.45	1.45	1.8	2.0	2.2	2.0
27	2.1	2.0	4.4	4.05	3.1	1.7	1.45	1.45	1.75	2.0	2.2	2.05
28	2.1	2.05	4.4	4.1	3.0	1.65	1.45	1.5	1.75	2.0	2.2	2.1
29	2.1	.....	4.3	4.15	2.95	1.6	1.45	1.5	1.8	2.0	2.2	2.0
30	2.0	.....	4.2	4.2	2.9	1.5	1.45	1.5	1.8	2.0	2.2	2.0
31	2.0	.....	4.1	.....	2.8	.....	1.45	1.4	.....	2.0	.....	2.0

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to Feb. 12. Probably no backwater from ice during December.

Daily discharge, in second-feet, of Bear River near Preston, Idaho, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	845	3,070	3,370	1,430	340	320	340	500	670	800
2	.....	.....	1,040	2,920	3,370	1,370	320	320	340	530	630	800
3	.....	.....	1,310	2,840	3,370	1,310	320	300	360	595	710	845
4	.....	.....	1,430	2,770	3,370	1,310	320	300	440	560	710	800
5	.....	.....	1,610	2,620	3,220	1,260	300	300	440	560	710	800
6	.....	.....	1,550	2,620	3,370	1,200	300	300	440	560	710	800
7	.....	.....	1,800	2,620	3,220	1,200	300	300	440	560	630	755
8	.....	.....	1,860	2,620	3,070	1,200	300	280	440	560	630	755
9	.....	.....	2,060	2,620	3,070	1,140	300	260	440	560	630	755
10	.....	.....	2,060	2,620	3,070	1,090	280	260	440	560	630	800
11	.....	.....	2,340	2,620	3,070	1,090	280	280	440	560	630	800
12	.....	.....	2,920	2,770	3,070	1,040	260	340	440	560	630	800
13	.....	630	3,840	2,700	3,000	980	260	340	440	560	670	800
14	.....	630	5,620	2,700	2,920	980	260	320	440	560	670	755
15	.....	630	6,380	2,700	2,840	980	260	300	440	630	670	670
16	.....	630	6,280	2,700	2,770	980	260	300	440	630	670	630
17	.....	630	6,080	2,770	2,620	935	300	300	470	710	710	630
18	.....	630	5,530	2,770	2,620	890	320	340	470	755	710	630
19	.....	630	4,990	2,840	2,550	845	300	340	470	800	710	630
20	.....	630	4,810	2,840	2,480	800	300	300	470	630	710	630
21	.....	630	4,540	2,920	2,410	710	300	300	470	670	710	710
22	.....	630	4,450	2,920	2,340	595	300	320	470	630	710	710
23	.....	630	4,180	2,920	2,270	560	300	320	440	630	755	710
24	.....	630	4,000	2,920	2,200	530	300	320	440	630	755	710
25	.....	630	4,000	2,920	2,130	500	320	320	470	630	800	710
26	.....	630	3,840	3,070	1,930	470	320	320	500	630	800	630
27	.....	630	3,680	3,140	1,800	440	320	320	470	630	800	670
28	.....	670	3,680	3,220	1,670	410	320	340	470	630	800	710
29	.....	.....	3,520	3,300	1,610	380	320	340	500	630	800	630
30	.....	.....	3,370	3,370	1,550	340	320	340	500	630	800	630
31	.....	.....	3,220	.....	1,430	.....	320	300	.....	630	.....	630

NOTE.—Daily discharge determined from a discharge rating curve well defined below 3,500 second-feet.

Monthly discharge of Bear River near Preston, Idaho, for 1910.

[Drainage area, 4,500 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	.....	.....	677	0.150	0.17	41,600	D.
February	670	.....	569	.126	.13	31,600	D.
March	6,380	845	3,450	.767	.88	212,000	B.
April	3,370	2,620	2,850	.633	.71	170,000	A.
May	3,370	1,430	2,640	.587	.68	162,000	A.
June	1,430	340	899	.200	.22	53,500	A.
July	340	260	301	.067	.08	18,500	A.
August	340	260	311	.069	.08	19,100	A.
September	500	340	446	.099	.11	26,500	A.
October	800	500	610	.136	.16	37,500	A.
November	800	630	706	.157	.18	42,000	A.
December	845	630	720	.160	.18	44,300	A.
The year	.....	.....	1,190	.264	3.58	859,000	

NOTE.—Discharge Jan. 1 to Feb. 12 estimated from climatologic records and observer's notes in regard to ice. Mean discharge Feb. 1 to 12 estimated at 483 second-feet.

BEAR RIVER NEAR COLLINSTON, UTAH.

This station, which is located at the lower end of Bear River canyon, about one-fourth mile below the Utah Sugar Co.'s power plant and about 4 miles north of the Collinston railroad station, was established July 1, 1889. The records show practically the amount of unappropriated water below all diversions.

The principal tributaries above are Cub Creek and Logan River; the only tributary below is Malade River, which enters 18 or 20 miles below the station. Most of the normal low-water flow of the river at this point is appropriated by the Bear River Canal Co., which diverts water at a point about 2 miles above the station. The Utah Sugar Co. also diverts water about 2 miles above the station for power development, but returns it to the river above the station.

The gage is an inclined staff; its datum has not been changed since the station was established.

The channel is fairly permanent and the conditions favor accurate determination of discharge.

Measurements are made from a car and cable.

The records are not affected by artificial control below, but some variations in daily flow may be caused by manipulation of gates on the dam 2 miles above the station. A little shore ice occasionally forms at the station, but the effect on the discharge is very slight.

Discharge measurements of Bear River near Collinston, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 3	G. H. Canfield	221	296	1.15	343
3	do	220	295	1.15	336
Sept. 8	do	233	324	1.31	474
8	do	233	320	1.30	457
Oct. 6	do	271	501	1.94	989
Dec. 12	J. C. Dort	270	612	2.44	1,520

Daily gage height, in feet, of Bear River near Collinston, Utah, for 1910.

[R. A. Johnson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.6	2.8	5.7	5.3	2.9	1.0	1.1	1.0	1.7	2.2	2.3
2	3.2	2.7	2.4	5.4	5.2	2.8	1.1	1.1	1.0	1.7	2.1	2.3
3	3.2	2.9	4.0	5.3	5.2	2.7	1.0	1.1	1.0	1.8	2.1	2.3
4	3.2	2.5	4.5	5.4	5.1	2.6	1.0	1.1	1.0	1.8	2.1	2.4
5	3.2	2.5	4.6	5.6	5.0	2.6	.....	1.1	1.0	1.9	2.2	2.4
6	3.2	2.4	4.7	5.6	5.0	2.5	.....	1.1	1.0	2.0	2.1	2.4
7	3.0	2.6	4.9	5.4	4.9	2.4	.....	1.1	1.0	2.0	2.1	2.4
8	3.0	2.6	5.0	5.2	4.8	2.4	.....	1.1	1.0	2.0	2.2	2.3
9	3.0	2.6	5.0	5.1	4.8	2.3	.....	1.1	1.0	2.0	2.1	2.3
10	3.0	2.7	5.0	4.9	4.7	2.3	.....	1.1	1.0	2.0	2.1	2.3
11	3.0	2.7	4.9	4.7	4.7	2.3	.....	1.1	1.0	2.0	2.1	2.3
12	3.0	2.8	4.7	4.6	4.6	2.2	.....	1.0	1.2	2.0	2.1	2.4
13	3.0	2.7	4.8	4.6	4.6	2.2	.....	1.0	1.3	2.0	2.1	2.4
14	3.0	2.6	4.9	4.7	4.6	2.2	.....	1.1	1.4	2.0	2.1	2.4
15	3.0	2.7	5.3	4.8	4.5	2.1	.....	1.0	1.5	2.0	2.1	2.3
16	3.0	2.6	5.8	4.9	4.5	2.1	.....	1.0	1.5	2.0	2.2	2.3
17	2.9	2.4	6.1	5.0	4.4	2.0	.....	1.0	1.6	2.0	2.1	2.3
18	2.8	2.6	6.2	4.9	4.3	1.9	.....	1.0	1.6	2.0	2.1	2.3
19	2.8	2.7	6.4	4.8	4.2	1.9	.....	1.0	1.6	2.1	2.1	2.2
20	2.8	2.7	6.4	4.8	4.1	1.8	.....	1.0	1.7	2.1	2.2	2.2
21	2.8	2.6	6.4	4.8	4.0	1.7	.....	1.0	1.6	2.2	2.2	2.1
22	2.9	2.6	6.3	4.9	3.9	1.6	.....	1.0	1.6	2.2	2.2	2.1
23	2.9	2.6	6.3	4.9	3.8	1.4	.....	1.0	1.7	2.2	2.3	2.2
24	2.8	2.7	6.2	4.9	3.7	1.2	.....	1.0	1.6	2.2	2.3	2.2
25	2.8	2.7	6.2	4.9	3.6	1.1	1.0	1.0	1.6	2.1	2.3	2.2
26	2.7	2.8	6.1	4.9	3.4	1.0	1.1	1.0	1.6	2.1	2.3	2.2
27	2.7	2.7	6.0	4.8	3.3	1.0	1.1	1.0	1.6	2.2	2.3	2.2
28	2.7	2.7	5.9	4.9	3.2	1.0	1.1	0.8	1.7	2.3	2.3	2.2
29	2.7	.....	5.7	5.1	3.1	1.0	1.1	0.8	1.7	2.3	2.2	2.2
30	2.6	.....	5.5	5.3	3.0	1.1	1.1	0.8	1.7	2.2	2.3	2.2
31	2.5	.....	5.4	.....	2.9	.....	1.1	0.8	.....	2.2	.....	2.2

NOTE.—July 5–14, water below gage, which ends at 1 foot. July 15–24, water below gage except from 4 p. m. to 12 p. m. each day while the power plant was in operation. Gage read 1 foot while the power plant was in operation. Aug. 28–31, water from 1 inch to 4 inches below gage; gage heights estimated. Gage heights probably not affected by ice during 1910.

Daily discharge, in second-feet, of Bear River near Collinston, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,830	2,080	2,300	6,200	5,520	2,000	250	310	250	780	1,250	1,350
2	2,830	2,190	1,860	5,690	5,350	1,890	310	310	250	780	1,150	1,350
3	2,830	2,420	3,980	5,520	5,350	1,780	250	310	250	870	1,150	1,350
4	2,830	1,970	4,790	5,690	5,180	1,670	250	310	250	870	1,150	1,450
5	2,830	1,970	4,960	6,030	5,010	1,670	.....	310	250	960	1,250	1,450
6	2,830	1,860	5,130	6,030	5,010	1,560	.....	310	250	1,050	1,150	1,450
7	2,550	2,080	5,470	5,690	4,840	1,450	.....	310	250	1,050	1,150	1,450
8	2,550	2,080	5,640	5,350	4,670	1,450	.....	310	250	1,050	1,250	1,350
9	2,550	2,080	5,640	5,180	4,670	1,350	.....	310	250	1,050	1,150	1,350
10	2,550	2,190	5,640	4,840	4,510	1,350	.....	310	250	1,050	1,150	1,350
11	2,550	2,190	5,470	4,510	4,510	1,350	.....	310	250	1,050	1,150	1,350
12	2,550	2,300	5,130	4,350	4,350	1,250	.....	250	380	1,050	1,150	1,450
13	2,550	2,190	5,300	4,350	4,350	1,250	.....	250	450	1,050	1,150	1,450
14	2,550	2,080	5,470	4,510	4,350	1,250	.....	310	530	1,050	1,150	1,450
15	2,550	2,190	6,150	4,670	4,200	1,150	.....	250	610	1,050	1,150	1,350
16	2,550	2,080	7,040	4,840	4,200	1,150	.....	250	610	1,050	1,250	1,350
17	2,420	1,860	7,600	5,010	4,050	1,050	.....	250	690	1,050	1,150	1,350
18	2,300	2,080	7,800	4,840	3,900	960	.....	250	690	1,050	1,150	1,350
19	2,300	2,190	7,500	4,670	3,750	960	.....	250	690	1,150	1,150	1,250
20	2,300	2,190	7,500	4,670	3,600	870	.....	250	780	1,150	1,250	1,250
21	2,300	2,080	7,500	4,670	3,450	780	.....	250	690	1,250	1,250	1,150
22	2,420	2,080	7,300	4,840	3,300	690	.....	250	690	1,250	1,250	1,150
23	2,420	2,080	7,300	4,840	3,160	530	.....	250	780	1,250	1,350	1,250
24	2,300	2,190	7,100	4,840	3,020	380	.....	250	690	1,250	1,350	1,250
25	2,300	2,190	7,100	4,840	2,890	310	250	250	690	1,150	1,350	1,250
26	2,190	2,300	6,910	4,840	2,630	250	310	250	690	1,150	1,350	1,250
27	2,190	2,190	6,720	4,670	2,500	250	310	250	690	1,250	1,350	1,250
28	2,190	2,190	6,540	4,840	2,370	250	310	160	780	1,350	1,350	1,250
29	2,190	.....	6,200	5,180	2,240	250	310	160	780	1,350	1,250	1,250
30	2,080	.....	5,860	5,520	2,120	310	310	160	780	1,250	1,350	1,250
31	1,970	.....	5,690	.....	2,000	.....	310	160	.....	1,250	.....	1,250

NOTE.—Daily discharge determined as follows: Jan. 1 to Mar. 18, from the 1909 discharge rating curve, which is well defined; Mar. 19 to Dec. 31, from a curve well defined below 6,000 second-feet. Warm rains and rapid melting of the snow at the head of the river during March caused a sudden rise at the gaging station.

Monthly discharge of Bear River near Collinston, Utah, for 1910.

[Drainage area, 6,000 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	2,830	1,970	2,460	0.410	0.47	151,000	A.
February	2,420	1,860	2,130	.355	.37	118,000	A.
March	7,800	1,860	5,950	.992	1.14	366,000	B.
April	6,200	4,350	5,060	.843	.94	301,000	A.
May	5,520	2,000	3,900	.650	.75	240,000	A.
June	2,000	250	1,050	.175	.20	62,500	A.
July	310	20	141	.024	.03	8,670	D.
August	310	160	262	.044	.05	16,100	C.
September	780	250	515	.086	.10	30,600	B.
October	1,350	780	1,100	.183	.21	67,600	A.
November	1,350	1,150	1,220	.203	.23	72,600	A.
December	1,450	1,150	1,320	.220	.25	81,200	A.
The year	7,800	20	2,090	.348	4.74	1,520,000	

NOTE.—Discharge July 5 to 24 estimated from information regarding the operation of the power plant. Mean discharge July 5 to 24 estimated at 60 second-feet.

LOGAN RIVER NEAR LOGAN, UTAH.

This station, which is located near the mouth of the canyon, about one-fourth mile below the Hercules power house and about 2 miles east of Logan, Utah, was established June 1, 1896, discontinued July 18, 1903, and reestablished April 13, 1904.

The only tributaries below the station are Blacksmith Fork and Cache River, which enter at distances of 5 and 10 miles, respectively. Above the station water is diverted to develop power, but is returned to the river. Water is also diverted above the station to the Logan, Hyde Park, and Smithfield canal, and the discharge of this canal should be added to that of the river at the gaging section to determine the total run-off from the drainage area at this point. Below the station practically all the normal low-water flow is diverted for irrigation.

The gage is an inclined staff; its datum has remained unchanged since January 1, 1906.

Discharge measurements are made by means of a car and cable.

The flow past the gage is not affected by artificial control or by ice, but the velocity of the current is so high that the stream bed is likely to shift greatly at high and medium stages and conditions for accurately determining the discharge are therefore rather unfavorable. Although the results are liable to some error during the first part of 1910 the records may be considered good during the later part of the year.

Discharge measurements of Logan River near Logan, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec. feet.*
Apr. 19	E. S. Fuller	59	146	3.35	683
Aug. 4	G. H. Canfield	44	89	2.17	218
Sept. 3	do	44	79	2.06	175
Oct. 5	do	46	84	2.11	186
Dec. 13	Dort and Palmer	42	65	1.90	122

Daily gage height, in feet, of Logan River near Logan, Utah, for 1910.

[S. G. Palmer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.3	2.2	2.15	2.75	3.7	3.45	.....	2.3	2.05	2.1	2.1	1.95
2	2.3	2.2	2.2	2.85	3.6	3.4	2.55	2.3	2.05	2.15	2.05	1.95
3	2.25	2.2	2.3	2.9	3.5	3.4	2.55	2.3	2.05	2.1	2.05	1.95
4	2.25	2.2	2.3	2.9	3.45	3.3	2.5	2.25	2.05	2.2	2.05	1.95
5	2.2	2.2	2.4	2.85	3.45	3.3	2.45	2.15	2.0	2.15	2.0	1.9
6	2.2	2.2	2.4	2.8	3.3	3.25	2.45	2.2	2.05	2.1	2.0	1.9
7	2.2	2.1	2.4	2.85	3.25	3.2	2.45	2.2	2.05	2.1	2.0	1.95
8	2.2	2.1	2.5	2.9	3.25	3.15	2.45	2.2	2.05	2.1	2.0	1.9
9	2.2	2.1	2.45	3.0	3.45	3.1	2.45	2.2	2.05	2.1	2.0	1.95
10	2.2	2.1	2.4	3.1	3.7	3.1	2.45	2.2	2.1	2.1	2.0	1.95
11	2.2	2.1	2.4	3.3	3.75	3.15	2.4	2.2	2.1	2.1	2.0	1.95
12	2.2	2.2	2.4	3.25	3.8	3.05	2.4	2.2	2.1	2.15	2.0	1.95
13	2.2	2.2	2.45	3.3	3.85	3.05	2.4	2.2	2.1	2.1	2.0	1.9
14	2.2	2.2	2.5	3.25	3.75	3.05	2.35	2.2	2.1	2.1	2.0	2.0
15	2.2	2.1	2.6	3.15	3.65	3.0	2.4	2.2	2.1	2.1	2.0	1.95
16	2.2	2.1	2.6	3.15	3.5	3.0	2.4	2.2	2.15	2.0	2.0	1.95
17	2.2	2.1	2.65	3.1	3.4	2.9	2.4	2.15	2.2	2.05	2.0	1.95
18	2.2	2.1	2.75	3.25	3.4	2.9	2.35	2.2	2.15	2.1	1.95	1.95
19	2.2	2.1	2.8	3.3	3.4	2.85	2.3	2.2	2.1	2.05	2.0	1.9
20	2.2	2.15	2.85	3.3	3.35	2.8	2.25	2.15	2.1	2.0	1.9	1.9
21	2.2	2.1	3.0	3.4	3.35	2.75	2.3	2.15	2.1	2.0	2.0	1.9
22	2.1	2.1	3.15	3.5	3.4	2.75	2.3	2.15	2.1	2.0	2.0	1.9
23	2.1	2.1	3.1	3.6	3.5	2.7	2.25	2.15	2.1	2.0	1.9	1.9
24	2.1	2.1	3.0	3.7	3.55	2.65	2.25	2.15	2.1	2.0	1.95	1.95
25	2.2	2.1	2.9	3.8	3.6	2.7	2.3	2.1	2.1	2.05	2.0	1.95
26	2.2	2.1	3.1	3.95	3.6	2.65	2.25	2.1	2.1	2.05	2.0	1.9
27	2.2	2.1	2.85	4.0	3.5	2.65	2.2	2.1	2.1	2.05	1.9	1.85
28	2.2	2.1	2.85	4.0	3.5	.....	2.3	2.1	2.1	2.1	1.9	1.85
29	2.2	.....	2.8	4.1	3.45	.....	2.35	2.0	2.1	2.1	1.9	1.90
30	2.2	.....	2.7	4.0	3.45	.....	2.3	2.05	2.1	2.1	1.9	1.85
31	2.2	.....	2.75	.....	3.4	.....	2.3	2.05	.....	2.05	.....	1.80

Daily discharge, in second-feet, of Logan River near Logan, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	133	103	90	322	1,320	1,110	430	275	172	190	190	138
2	133	103	103	372	1,240	1,060	418	275	172	210	172	138
3	118	103	133	398	1,150	1,060	418	275	172	190	172	138
4	118	103	133	398	1,110	980	385	252	172	230	172	138
5	103	103	168	372	1,110	980	356	210	154	210	154	122
6	103	103	168	346	980	940	356	230	172	190	154	122
7	103	76	168	372	940	900	356	230	172	190	154	138
8	103	76	207	398	940	860	356	230	172	190	154	122
9	103	76	188	455	1,110	820	356	230	172	190	154	138
10	103	76	168	517	1,320	820	356	230	190	190	154	138
11	103	76	168	655	1,360	860	327	230	190	190	154	138
12	103	103	168	620	1,410	780	327	230	190	210	154	138
13	103	103	188	655	1,460	780	327	230	190	190	154	122
14	103	103	207	620	1,360	780	301	230	190	190	154	154
15	103	76	250	551	1,280	740	327	230	190	190	154	138
16	103	76	250	551	1,150	740	327	230	210	154	154	138
17	103	76	274	517	1,060	660	327	210	230	172	154	138
18	103	76	322	620	1,060	660	301	230	210	190	138	138
19	103	76	346	655	1,060	622	275	230	190	172	154	122
20	103	90	372	655	1,020	585	252	210	190	154	122	122
21	103	76	455	727	1,020	550	275	210	190	154	154	122
22	76	76	551	800	1,060	550	275	210	190	154	154	122
23	76	76	517	874	1,150	515	252	210	190	154	122	122
24	76	76	455	950	1,190	482	252	210	190	154	138	138
25	103	76	398	1,030	1,240	515	275	190	190	172	154	138
26	103	76	517	1,150	1,240	482	252	190	190	172	154	122
27	103	76	372	1,200	1,150	482	230	190	190	172	122	108
28	103	76	372	1,200	1,150	468	275	190	190	190	122	108
29	103	.....	346	1,280	1,110	455	301	154	190	190	122	122
30	103	.....	298	1,200	1,110	442	275	172	190	190	122	108
31	103	.....	322	.....	1,060	.....	275	172	.....	172	.....	94

NOTE.—Daily discharge determined as follows: Jan. 1 to Apr. 30, from a discharge rating curve fairly well defined between 500 and 800 second-feet; May 1 to Dec. 31, from a curve well defined below 300 second-feet. Discharge interpolated June 28 to July 1.

Monthly discharge of Logan River near Logan, Utah, for 1910.

[Drainage area, 218 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	133	76	113	0.518	0.60	6,950	C.
February	103	76	85.2	.391	.41	4.730	C.
March	551	90	280	1.28	1.48	17,200	C.
April	1,280	322	682	3.13	3.49	40,600	B.
May	1,460	940	1,160	5.32	6.13	71,300	C.
June	1,110	442	723	3.32	3.70	43,000	C.
July	430	230	317	1.45	1.67	19,500	B.
August	275	154	219	1.00	1.15	13,500	A.
September	230	154	187	.858	.96	11.100	A.
October	230	154	183	.840	.97	11,300	A.
November	190	122	150	.688	.77	8,930	A.
December	154	94	128	.587	.68	7,870	A.
The year	1,460	76	353	1.62	22.01	256.000	

NOTE.—Discharge of Logan, Hyde Park, and Smithfield Canal excluded for lack of sufficient data. For information regarding the probable effect of this omission from month to month see table of monthly discharge of Logan River at Logan for 1909, Water-Supply Paper No. 270, p. 43.

BLACKSMITH FORK NEAR HYRUM, UTAH.

Blacksmith Fork rises on the western slope of the Bear River Range and flows southwest and then northwest into Logan River. The drainage basin of the tributary is in every way similar to that of the main stream. Only the flood and winter discharge, however, reaches the Logan, the entire spring and summer flow being used for irrigation on the tillable lands below the gaging station.

The gaging station, which is located at the mouth of the canyon, about 10 miles southeast of Logan and about 5 miles from Hyrum, the nearest railway and post office point, was established July 19, 1900, discontinued December 31, 1902, and reestablished May 16, 1904. The original station was above the intake of the power canal; the present station is about 500 feet below the intake of the power canal and about 800 feet above the Hyrum city power plant. The flow of the power plant canal plus that passing the station represents the total amount of water available for irrigation in the valley below and for power development above.

The gage is a vertical staff. Its datum has not been changed since the new stations were established, in 1904.

Discharge measurements are made by means of a car and cable.

The flow is not affected by artificial control above or below the station or by ice at the gage. The velocity of the current is very high, and a slight shifting of the channel renders the determinations of discharge somewhat liable to error during high water. The results, however, may be considered fairly good.

Discharge measurements of Blacksmith Fork near Hyrum, Utah, 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 19	E. S. Fuller	49	84	4.80	145
Dec. 13	J. C. Dort	45	37	3.65	76

Daily gage height, in feet, of Blacksmith Fork near Hyrum, Utah, for 1910.

[Uriah Benson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.1	3.8	4.1	4.8	4.8	4.2	4.2	3.8	3.7	3.7	3.7	3.7
2	4.1	3.8	4.1	4.7	4.8	4.2	4.2	3.8	3.7	3.7	3.7	3.7
3	3.9	3.8	4.1	4.7	4.8	4.2	4.1	3.8	3.7	3.7	3.7	3.7
4	3.9	3.8	4.1	4.7	4.8	4.2	4.1	3.7	3.7	3.7	3.7	3.7
5	3.9	3.8	4.1	4.7	4.8	4.2	4.1	3.7	3.7	3.7	3.7	3.7
6	3.9	3.8	4.1	4.7	4.8	4.2	4.1	3.7	3.7	3.7	3.7	3.7
7	3.9	3.8	4.1	4.7	4.8	4.2	4.1	3.7	3.7	3.7	3.7	3.7
8	3.9	3.8	4.1	4.9	4.7	4.2	4.1	3.7	3.7	3.7	3.7	3.7
9	3.9	3.8	4.1	5.1	4.7	4.2	4.1	3.7	3.7	3.7	3.7	3.7
10	3.9	3.8	4.1	5.1	4.6	4.2	4.1	3.7	3.7	3.7	3.7	3.7
11	3.9	3.8	4.1	5.1	4.6	4.2	4.1	3.7	3.7	3.7	3.7	3.65
12	3.9	3.8	4.1	5.1	4.5	4.2	4.1	3.7	3.7	3.7	3.7	3.65
13	3.9	3.8	4.1	4.9	4.5	4.2	4.1	3.7	3.7	3.7	3.7	3.65
14	3.9	3.8	4.1	4.9	4.5	4.2	4.1	3.7	3.7	3.7	3.7	3.65
15	3.9	3.8	4.1	4.8	4.5	4.2	4.1	3.7	3.7	3.7	3.7	3.65
16	3.9	3.8	4.1	4.8	4.5	4.2	4.1	3.7	3.7	3.7	3.7	3.65
17	3.8	3.8	4.3	4.8	4.4	4.1	4.0	3.7	3.7	3.7	3.7	3.65
18	3.8	3.8	4.4	4.8	4.4	4.1	4.0	3.7	3.7	3.7	3.7	3.65
19	3.8	3.8	4.5	4.8	4.4	4.1	3.9	3.7	3.7	3.7	3.7	3.65
20	3.8	3.8	4.5	4.8	4.4	4.1	3.9	3.7	3.7	3.7	3.7	3.65
21	3.8	3.9	4.7	4.8	4.4	4.1	3.9	3.7	3.7	3.7	3.7	3.65
22	3.8	3.9	4.8	4.8	4.4	4.2	3.8	3.7	3.7	3.7	3.7	3.65
23	3.8	3.9	4.9	4.8	4.4	4.2	3.8	3.7	3.7	3.7	3.7	3.65
24	3.8	3.9	4.9	4.8	4.3	4.2	3.8	3.7	3.7	3.7	3.7	3.65
25	3.8	3.9	4.9	4.8	4.3	4.2	3.8	3.7	3.7	3.7	3.7	3.65
26	3.8	3.9	4.9	4.8	4.3	4.2	3.8	3.7	3.7	3.7	3.7	3.65
27	3.8	4.1	4.9	4.8	4.3	4.2	3.8	3.7	3.7	3.7	3.7	3.65
28	3.8	4.1	4.9	4.8	4.3	4.2	3.8	3.7	3.7	3.7	3.7	3.5
29	3.8	.....	4.9	4.8	4.3	4.2	3.8	3.7	3.7	3.7	3.7	3.5
30	3.8	.....	4.9	4.8	4.3	4.2	3.8	3.7	3.7	3.7	3.7	3.5
31	3.8	.....	4.9	.....	4.3	.....	3.8	3.7	.....	3.7	.....	3.5

Daily discharge, in second-feet, of Blacksmith Fork near Hyrum, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	184	107	184	427	427	214	214	107	86	86	86	86
2	184	107	184	385	427	214	214	107	86	86	86	86
3	130	107	184	385	427	214	184	107	86	86	86	86
4	130	107	184	385	427	214	184	86	86	88	86	86
5	130	107	184	385	427	214	184	86	86	86	86	86
6	130	107	184	385	427	214	184	86	86	86	86	86
7	130	107	184	385	427	214	184	86	86	86	86	86
8	130	107	184	471	385	214	184	86	86	86	85	86
9	130	107	184	566	385	214	184	86	86	86	86	86
10	130	107	184	566	346	214	184	86	86	86	86	86
11	130	107	184	566	346	214	184	86	86	86	86	76
12	130	107	184	566	310	214	184	86	86	86	86	76
13	130	107	184	471	310	214	184	86	86	86	86	76
14	130	107	184	471	310	214	184	86	86	86	86	76
15	130	107	184	427	310	214	184	86	86	86	86	76
16	130	107	184	427	310	214	184	86	86	86	86	76
17	107	107	244	427	276	184	156	86	86	86	86	76
18	107	107	276	427	276	184	156	86	86	86	86	76
19	107	107	310	427	276	184	130	86	86	86	86	76
20	107	107	310	427	276	184	130	86	86	86	86	76
21	107	130	385	427	276	184	130	86	86	86	86	76
22	107	130	427	427	276	214	107	86	86	86	86	76
23	107	130	471	427	276	214	107	86	86	86	86	76
24	107	130	471	427	244	214	107	86	86	86	86	76
25	107	130	471	427	244	214	107	86	86	86	86	76
26	107	130	471	427	244	214	107	86	86	86	86	76
27	107	184	471	427	244	214	107	86	86	86	86	76
28	107	184	471	427	244	214	107	86	86	86	86	53
29	107	.....	471	427	244	214	107	86	86	86	86	53
30	107	.....	471	427	244	214	107	86	86	86	86	53
31	107	.....	471	.....	244	.....	107	86	.....	86	.....	53

NOTE.—Daily discharge determined from a fairly well defined discharge rating curve.

Daily combined discharge, in second-feet, of Blacksmith Fork and power-plant race near Hyrum, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	265	188	265	513	535	295	295	215	194	194	194	176
2	265	188	265	471	535	295	295	215	194	194	194	176
3	202	188	265	471	535	295	265	215	194	194	194	176
4	202	188	265	471	535	295	265	194	194	194	194	176
5	202	188	265	471	535	295	265	194	194	194	194	176
6	202	188	265	471	535	295	265	194	194	194	176	176
7	202	188	265	471	535	295	265	194	194	194	176	176
8	202	188	265	557	484	295	265	194	194	194	176	176
9	202	188	265	652	484	295	265	194	194	194	176	176
10	202	188	265	652	445	295	265	194	194	194	176	176
11	202	188	265	652	445	295	265	194	194	194	176	166
12	202	188	265	652	409	295	265	194	194	194	176	166
13	211	188	265	557	391	295	265	194	194	194	176	166
14	211	188	265	557	391	295	265	194	194	194	176	166
15	211	188	265	493	391	295	265	194	194	194	176	166
16	211	188	265	493	391	295	265	194	194	194	176	166
17	188	188	325	545	357	265	264	194	194	194	176	166
18	188	188	357	545	357	265	264	194	194	194	176	166
19	188	188	391	545	257	265	238	194	194	194	176	166
20	188	188	391	545	357	265	238	194	194	194	176	166
21	188	211	466	545	357	265	238	194	194	194	176	166
22	188	211	508	545	357	295	215	194	194	194	176	166
23	188	211	557	545	357	295	215	194	194	194	176	166
24	188	211	557	535	325	295	215	194	194	194	176	166
25	188	211	557	535	325	295	215	194	194	194	176	166
26	188	211	557	535	325	295	215	194	194	194	176	166
27	188	265	557	535	325	295	215	194	194	194	176	166
28	188	265	557	535	325	295	215	194	194	194	176	143
29	188	.....	557	535	325	295	215	194	194	194	176	143
30	188	.....	557	535	325	295	215	194	194	194	176	143
31	188	.....	557	.....	325	.....	215	194	.....	194	.....	143

Combined monthly discharge of Blacksmith Fork and power-plant race near Hyrum, Utah, for 1910.

[Drainage area, 286 square miles.]

Month.	Discharge in second-feet.						Run-off.		Accuracy.
	Maximum.	Minimum.	Blacksmith Fork, mean.	Power-plant race, mean.	Total mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	265	188	122	78.1	200	0.699	0.81	12,300	B.
February	265	188	117	81.0	198	.692	.72	11,000	B.
March	557	265	295	82.5	378	1.32	1.52	23,200	B.
April	652	471	442	98.6	540	1.89	2.11	32,100	B.
May	535	325	319	90.0	409	1.43	1.65	25,100	B.
June	295	265	209	81.0	290	1.01	1.13	17,300	B.
July	295	215	154	94.1	248	.867	1.00	15,200	B.
August	215	194	88.0	108	196	.685	.79	12,100	A.
September	194	194	86.0	108	194	.678	.76	11,500	A.
October	194	194	86.0	108	194	.678	.78	11,900	A.
November	194	176	86.0	93.0	179	.626	.70	10,700	B.
December	176	143	76.3	90.0	166	.581	.67	10,200	B.
The year	652	143	173	92.8	266	.930	12.64	193,000	

NOTE.—Computations based on combined run-off of Blacksmith Fork and the power-plant race. Total run-off for the year 1910 at the Blacksmith Fork gaging station, 126,000 acre-feet; in the power-plant race, 67,000 acre feet.

BLACKSMITH FORK POWER-PLANT RACE NEAR HYRUM, UTAH.

This station, which is located 200 feet below the head of the Blacksmith Fork power-plant race, was established May 16, 1904.

The records derived from observations at this station indicate the amount of water used by the Hyrum City power plant and the amount of water being carried around the Blacksmith Fork station by the canal.

The flow at this station should be added to that of Blacksmith Fork after May 16, 1904, to give the total run-off of that river. For monthly discharge at this station see table above.

The gage consists of a vertical staff. The channel is practically permanent.

Discharge measurements are made from a 3 by 16 inch plank laid across the canal.

The variation in stage is very small, and although the rating curve is short the record may be considered good.

Discharge measurements of power-plant race near Hyrum, Utah, 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 19	E. S. Fuller	18	28	5.30	118
Sept. 4	G. H. Canfield	14	30	5.20	108
Dec. 13	J. C. Dort	14	25	4.95	74

Daily gage heights, in feet, of Blacksmith Fork power-plant race near Hyrum, Utah, for 1910.

[Uriah Benson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.9	4.9	4.9	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.2	5.0
2	4.9	4.9	4.9	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.2	5.0
3	4.8	4.9	4.9	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.2	5.0
4	4.8	4.9	4.9	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.2	5.0
5	4.8	4.9	4.9	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.2	5.0
6	4.8	4.9	4.9	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.0	5.0
7	4.8	4.9	4.9	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.0	5.0
8	4.8	4.9	4.9	4.95	5.1	4.9	4.9	5.2	5.2	5.2	5.0	5.0
9	4.8	4.9	4.9	4.95	5.1	4.9	4.9	5.2	5.2	5.2	5.0	5.0
10	4.8	4.9	4.9	4.95	5.1	4.9	4.9	5.2	5.2	5.2	5.0	5.0
11	4.8	4.9	4.9	4.95	5.1	4.9	4.9	5.2	5.2	5.2	5.0	5.0
12	4.8	4.9	4.9	4.95	5.1	4.9	4.9	5.2	5.2	5.2	5.0	5.0
13	4.9	4.9	4.9	4.95	4.9	4.9	4.9	5.2	5.2	5.2	7.0	5.0
14	4.9	4.9	4.9	4.95	4.9	4.9	4.9	5.2	5.2	3.2	5.0	5.0
15	4.9	4.9	4.9	4.95	4.9	4.9	4.9	5.2	5.2	5.2	5.0	5.0
16	4.9	4.9	4.9	4.95	4.9	4.9	4.9	5.2	5.2	5.2	5.0	5.0
17	4.9	4.9	4.9	5.3	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
18	4.9	4.9	4.9	5.3	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
19	4.9	4.9	4.9	5.3	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
20	4.9	4.9	4.9	5.3	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
21	4.9	4.9	4.9	5.3	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
22	4.9	4.9	4.9	5.3	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
23	4.9	4.9	4.95	5.3	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
24	4.9	4.9	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
25	4.9	4.9	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
26	4.9	4.9	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
27	4.9	4.9	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
28	4.9	4.9	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
29	4.9	.....	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
30	4.9	.....	4.95	5.2	4.9	4.9	5.2	5.2	5.2	5.2	5.0	5.0
31	4.9	.....	4.95	.....	4.9	.....	5.2	5.2	.....	5.2	.....	5.0

Daily discharge, in second-feet, of Blacksmith Fork power-plant race near Hyrum, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	81	81	81	86	108	81	81	108	108	108	108	90
2	81	81	81	86	108	81	81	108	108	108	108	90
3	72	81	81	86	108	81	81	108	108	108	108	90
4	72	81	81	86	108	81	81	108	108	108	108	90
5	72	81	81	86	108	81	81	108	108	108	108	90
6	72	81	81	86	108	81	81	108	108	108	90	90
7	72	81	81	86	108	81	81	108	108	108	90	90
8	72	81	81	86	99	81	81	108	108	108	90	90
9	72	81	81	86	99	81	81	108	108	108	90	90
10	72	81	81	86	99	81	81	108	108	108	90	90
11	72	81	81	86	99	81	81	108	108	108	90	90
12	72	81	81	86	99	81	81	108	108	108	90	90
13	81	81	81	86	81	81	81	108	108	108	90	90
14	81	81	81	86	81	81	81	108	108	108	90	90
15	81	81	81	86	81	81	81	108	108	108	90	90
16	81	81	81	86	81	81	81	108	108	108	90	90
17	81	81	81	118	81	81	108	108	108	108	90	90
18	81	81	81	118	81	81	108	108	108	108	90	90
19	81	81	81	118	81	81	108	108	108	108	90	90
20	81	81	81	118	81	81	108	108	108	108	90	90
21	81	81	81	118	81	81	108	108	108	108	90	90
22	81	81	81	118	81	81	108	108	108	108	90	90
23	81	81	86	118	81	81	108	108	108	108	90	90
24	81	81	86	108	81	81	108	108	108	108	90	90
25	81	81	86	108	81	81	108	108	108	108	90	90
26	81	81	86	108	81	81	108	108	108	108	90	90
27	81	81	86	108	81	81	108	108	108	108	90	90
28	81	81	86	108	81	81	108	108	108	108	90	90
29	81	.....	86	108	81	81	108	108	108	108	90	90
30	81	.....	86	108	81	81	108	108	108	108	90	90
31	81	.....	86	.....	81	.....	108	108	.....	108	.....	90

NOTE.—Daily discharge determined from a fairly well-defined discharge rating curve.

BOX ELDER CREEK AT BRIGHAM, UTAH.

Box Elder Creek is tributary to Box Elder Lake about 3 miles northwest of Brigham, Utah. At high stages water from this lake may reach Bear River.

The gaging station, which is located about three-fourths mile northwest of Brigham City, Utah, on the Third West Street Bridge, about half a mile above the Oregon Short Line Railroad crossing, was established May 20, 1909.

A vertical gage is attached to the northwest corner of the bridge. It was lowered 2 feet on February 24, 1910, in order to obviate negative readings.

The relation between gage height and discharge at this point is not greatly affected by ice, but it is affected by artificial control above the station.

The gage heights for 1909 were not published in the report for that year (Water-Supply Paper 270) as they were considered unreliable. The inaccuracy, however, can not be definitely proved and the records are here presented. These records and also those for January 1 to March 31, 1910, which are also questionable, are at best only approximate, and computations based on them should be used with great caution. The record beginning April 8, 1910, when a new observer was engaged, is considered reliable.

Discharge measurements of Box Elder Creek at Brigham, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 24	E. A. Porter	15	10	3.35	17
Apr. 8	E. S. Fuller	16	16	4.20	55
Dec. 8	J. C. Dort	13	5.6	3.32	14.6
27	.....do	10.5	6.4	3.38	14.5

NOTE.—All gage heights refer to the new datum established Feb. 24, 1910.

Daily gage height, in feet, and discharge, in second-feet, of Box Elder Creek at Brigham Utah, for 1909.

Day.	May.		June.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.85	37		0	0.75	2	1.65	28	1.65	
2			.95	5		0	.75	2	1.65	28	1.65	
3			1.00	6		0	.75	2	1.65	28	1.65	
4			1.35	16		0	.75	2	1.65	28	1.65	
5			.90	4	0.75	2	.75	2	1.65	28	1.65	
6			1.00	6	.80	2	.75	2	1.65	28	1.65	
7			.90	4	.65	1	.75	2	1.65	28	1.65	
8			1.15	10	.65	1	.75	2	1.80	35	1.65	
9			1.85	37	.70	1	.75	2	1.80	35	1.65	
10			.70	34	.70	1	.75	2	1.80	35	1.65	
11			.65	31	.65	1	.75	2	1.80	35	1.65	
12			.30	28	.80	2	.75	2	1.65	28	1.65	
13			.20	25	.80	2	.75	2	1.65	28	1.65	
14			.30	23	.80	2	.75	2	1.65	28	1.65	
15			.30	20	.90	4	.75	2	1.65	28	1.65	
16			.10	17	.95	6	.75	2	1.65	28	1.65	
17			.25	14	.90	4	.70	1	1.65	28	1.65	
18			.10	11	.85	4	.70	1	1.65	28	1.65	
19			.20	9	.80	2	.70	1	1.65	28	1.65	
20	1.95	58	.20	7	.75	2	.70	1	2.10	50	1.65	
21	2.15	77	.20	5	.75	2	.70	1	2.15	52	1.65	
22	2.20	82	.20	2	.75	2	.70	1	2.15	52	1.65	
23	1.75	42		0	.75	2	.70	1	1.85	38	1.65	
24	2.35	98		0	.75	2	.70	1	1.85	38	1.65	
25	2.00	63		0	.75	2	.70	1	1.70	30	1.65	
26	1.90	40		0	.75	2	.70	1	1.70	30	1.65	
27	1.95	42		0	.75	2	.70	1	1.70	30	1.65	
28	2.00	45		0	.75	2	.70	1	1.70	30	1.65	
29	1.95	42		0	.75	2	.75	2	1.65	28	1.65	
30	1.35	17		0	.75	2	.80	2	1.65	28	1.65	
31	1.40	18					.75	2			1.65	

NOTE.—Gage heights June 10 to 22 questionable; not considered true indices of discharge. No water in creek June 23 to Sept. 4. The sudden increase in gage height on Nov. 1 suggests that the records from Sept. 5 to Oct. 31 may be unreliable, but the increase might have been caused by the closing of the headgates to the diversion canals above the gaging station. Gage heights for November and December thought to be fairly reliable, but the relation of gage height to discharge was probably affected by ice during December. See description.

Daily discharge determined from two fairly well defined discharge rating curves, one applicable from May 20 to 25 and the other from May 26 to Dec. 31. Discharge June 10 to 22 estimated as falling from discharge on June 9 to zero discharge June 23. Discharge Sept. 5 to Oct. 31 taken as a true index of gage heights, but may be much too small. See description.

Daily gage height, in feet, and discharge, in second-feet, of Box Elder Creek at Brigham, Utah, for 1910.

[Serell Nelson, observer.]

Day.	January.		February.		March.		April.		May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	3.65	.....	3.65	28	3.70	30	.....	85	3.7	30	3.0	6
2	3.65	.....	3.65	28	3.70	30	.....	82	3.7	30	3.1	9
3	3.65	.....	3.65	28	3.70	30	.....	79	3.7	30	3.1	9
4	3.65	.....	3.65	28	3.70	30	.....	75	3.7	30	3.1	9
5	3.65	.....	3.65	28	3.70	30	.....	72	3.7	30	3.1	9
6	3.65	.....	3.65	28	.....	.....	.....	68	3.8	35	3.0	6
7	3.65	.....	3.65	28	.....	.....	.....	60	3.8	35	3.0	6
8	3.65	.....	3.65	28	.....	.....	4.2	55	3.7	30	3.0	6
9	3.65	.....	3.65	28	.....	.....	4.3	61	3.7	30	3.0	6
10	3.65	.....	3.65	28	.....	.....	4.6	79	3.7	30	2.9	4
11	3.65	.....	3.65	28	.....	.....	4.5	73	3.6	26	2.9	4
12	3.65	.....	3.65	28	.....	.....	4.3	61	3.6	26	.....	0
13	3.65	.....	3.65	28	.....	.....	4.3	61	3.6	26	.....	0
14	3.65	.....	3.65	28	.....	.....	4.1	50	3.6	26	.....	0
15	3.65	.....	3.65	28	.....	.....	4.1	50	3.5	22	.....	0
16	3.65	.....	3.65	28	.....	.....	4.2	55	3.4	18	.....	0
17	3.65	.....	3.65	28	.....	.....	4.0	45	3.4	18	.....	0
18	3.65	.....	3.65	28	.....	.....	4.0	45	3.4	18	.....	0
19	3.65	.....	3.65	28	.....	.....	4.0	45	3.4	18	.....	0
20	3.65	.....	3.55	24	.....	.....	4.0	45	3.4	18	.....	0
21	3.65	.....	3.55	24	.....	.....	4.0	45	3.4	18	.....	0
22	3.65	.....	3.50	22	.....	.....	3.9	40	3.3	15	.....	0
23	3.65	.....	3.50	22	.....	.....	3.9	40	3.3	15	.....	0
24	3.65	.....	3.50	22	.....	.....	4.0	45	3.2	12	.....	0
25	3.65	.....	3.50	22	.....	.....	4.0	45	3.2	12	.....	0
26	3.65	.....	3.50	22	3.25	14	3.9	40	3.2	12	.....	0
27	3.65	.....	3.70	30	3.25	14	3.6	26	3.2	12	.....	0
28	3.65	.....	3.70	30	3.95	42	3.7	30	3.1	9	.....	0
29	3.65	.....	.....	.....	4.45	70	3.7	30	3.0	6	.....	0
30	3.65	.....	.....	.....	4.45	70	3.7	30	3.0	6	.....	0
31	3.65	.....	.....	.....	4.75	88	.....	.....	3.0	6	.....	.....

NOTE.—Relation between gage height and discharge probably affected by ice during January.

Gage lowered 2 feet on Feb. 24; all gage heights from Jan. 1 to Feb. 24 corrected to refer to new datum. The uniformity of the record from Feb. 1 to Mar. 5 would seem to indicate that the reading of the gage was neglected except at scattered dates. Gage heights Mar. 6 to 25 have been discarded as worthless. No record Apr. 1 to 7. Gage heights Apr. 8 to June 11 considered reliable, as a new observer was employed during this period. Creek dry June 12 to Aug. 31. No record Sept. 1 to Dec. 31.

Daily discharge determined from a discharge rating curve that is fairly well defined. Discharge interpolated Apr. 1 to 7.

Monthly discharge of Box Elder Creek at Brigham, Utah, for 1909 and 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1909.					
May 20–31	98	17	52	1,240	C.
June	37	0	12	714	C.
July	0	0	0	0	
August	0	0	0	0	
September	6	0	2	119	C.
October	2	1	2	123	C.
November	52	28	32	1,900	C.
December [a]			20	1,230	C.
The period				5,330	
1910.					
January [a]			20	1,230	C.
February	30	22	27	1,500	C.
March	88	14	31	1,910	C.
April	85	26	54	3,210	C.
May	35	6	21	1,290	C.
June	9	0	2	119	C.
July	0	0	0	0	
August	0	0	0	0	
September [a]			10	595	C.
October [a]			15	922	C.
November [a]			15	893	C.
December [a]			15	922	C.
The year				12,600	

[a] Estimated for month.

NOTE.—Discharge Mar. 6–25, 1910, estimated at 25 second-feet.

WEBER RIVER BASIN.

GENERAL FEATURES.

Weber River rises on the northern slope of the Uinta Mountains and flows in a tortuous course northwestward into Great Salt Lake.

The upper part of the basin is very rough. The highest peaks, reaching an elevation of about 13,000 feet above sea level, are barren masses of sandstone and quartzite, covered with snow for almost the entire year. The basin contains no extensive forests, meadows, or marshes. The greater part of the precipitation is in the form of snow, the melting of which is the chief source of the spring flood and early summer flow. A large part of the normal flow is derived from springs, which are well distributed over the area.

Between Oakley and Croyden the river traverses a very narrow valley given over to irrigated farms. The chief tributaries in this stretch are Beaver Creek, which enters from the south about 6 miles below Oakley and drains an area about 71 square miles in extent; Chalk Creek, from the east, which drains an area comprising about 428 square miles and enters 15 miles above Croyden; and Lost Creek, which comes in from the east at a point about one-half mile above the Devils Slide gaging station and drains 205 square miles of the basin.

Between Croyden and the Ogden Valley the stream flows through a comparatively narrow, steep canyon, broken here and there by stretches of valley containing irrigated farms. East Creek, which enters near Morgan, discharges but little water to the river, as its flow is completely controlled by a storage reservoir about 5 miles above its mouth, the water being used for irrigation in Morgan Valley, through which the Weber flows.

Ogden River, which joins the Weber about 8 miles above Plain City, drains a rugged limestone area, 363 square miles in extent, on the western slopes of the Wasatch Range. The main stream and its numerous small tributaries are confined to steep, narrow canyons. The entire normal flow of the stream is diverted for irrigation near the foot of the canyon about 3 miles above the mouth of the river, after being used for the development of power by the Utah Light & Railway Co. The flood and winter flow, therefore, is all that reaches the Weber, except for a small amount of seepage from the irrigated district. The city of Ogden also derives its water supply from Ogden River.

At present no storage reservoirs are used on the Weber, but a number of sites are available.

The wettest year since records have been kept was 1909, when 1,290,000 acre-feet wasted into Great Salt Lake from the Weber basin, as shown by the records at the Plain City station. The year 1905 was by far the driest year, when only 298,000 acre-feet wasted into Great Salt Lake.

WEBER RIVER NEAR OAKLEY, UTAH.

This station, which is located near the mouth of the canyon above Kamas Prairie, about 3 miles above Oakley, Utah, was established October 22, 1904. The records show the total amount of water available for diversion through Kamas Pass into Provo River in connection with the proposed Weber River project.

The station is below South Fork and above Kamas Creek and is above all diversions to the Kamas Prairie region.

The gage is an inclined staff; its datum has remained unchanged since the station was established.

Discharge measurements are made from a cable and car.

The bed of the stream is permanent. The river freezes over at the station at times during the winter season, but as the winter flow is fairly constant good results are obtained by interpolating between periods when the river is known to be open.

Discharge measurements of Weber River near Oakley, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 5	G. H. Canfield	43	54	4.07	96
Dec. 6	J. C. Dort	45	50	4.10	85

Daily gage height, in feet, of Weber River near Oakley, Utah, for 1910.

[John Fransan, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	4.5	.....	6.9	4.45	4.2	4.0	.....	4.0	.....
2	.....	.....	.....	4.55	5.5	6.8	4.4	4.1	4.0	4.0	4.0	3.95
3	.....	4.7	4.1	4.6	5.3	6.4	4.4	4.1	4.0	4.05	.....	3.95
4	.....	.....	.....	4.55	5.3	.....	.....	4.1	4.0	4.05	3.95	3.95
5	5.5	.....	.....	4.6	5.3	6.0	4.35	4.1	4.0	4.05	3.95	4.0
6	.....	.....	.....	4.6	5.35	5.8	4.35	4.1	3.95	4.0	3.95	4.1
7	.....	4.25	4.6	5.4	5.8	4.35	4.05	3.95	4.0	3.95	.....	
8	.....	.....	.....	4.7	5.5	5.7	4.35	4.05	.....	4.0	3.95	3.95
9	.....	.....	.....	4.8	5.8	5.65	4.3	4.0	3.95	.....	3.95	3.95
10	.....	4.5	4.2	4.9	6.1	5.6	4.3	4.0	3.95	4.0	3.95	3.95
11	5.3	.....	.....	5.0	6.4	5.4	4.3	4.0	3.95	4.0	3.95	4.0
12	.....	.....	.....	5.1	6.4	5.4	4.3	4.15	3.95	4.0	.....	4.0
13	.....	.....	.....	5.2	6.3	5.3	4.25	4.0	3.95	4.05	3.95	4.05
14	.....	.....	4.3	5.0	6.3	5.2	4.25	4.0	3.95	4.05	3.95	4.1
15	.....	.....	.....	4.9	6.3	5.1	4.35	4.0	3.95	4.0	3.95	.....
16	.....	.....	4.3	4.85	6.0	5.05	4.3	4.0	4.0	4.05	3.95	4.3
17	.....	4.4	.....	.....	.....	5.0	4.3	4.0	.....	4.1	.....	4.5
18	.....	.....	.....	5.0	5.6	4.95	4.25	4.0	4.05	4.1	3.95	4.3
19	.....	.....	4.4	5.1	5.7	4.9	4.25	4.0	4.05	4.1	3.95	4.3
20	4.5	.....	4.45	5.15	5.7	4.85	4.45	4.0	4.0	4.05	4.0	4.5
21	.....	.....	4.8	5.2	5.6	4.8	4.3	4.0	4.0	4.05	4.0	4.6
22	.....	.....	5.0	5.3	5.5	4.75	4.25	4.0	4.0	4.05	4.0	5.1
23	.....	.....	4.9	5.5	5.6	4.7	4.2	4.0	.....	4.05	4.0	5.1
24	.....	.....	4.8	5.6	5.7	4.65	4.2	4.0	4.0	4.05	4.0	.....
25	.....	4.9	4.7	5.8	6.0	4.6	4.15	4.0	4.0	4.05	.....	5.1
26	.....	.....	4.6	6.0	6.0	4.55	4.15	4.0	4.0	4.0	4.0	5.5
27	4.6	.....	4.6	6.1	5.9	4.5	4.15	4.0	4.0	4.0	4.0	5.6
28	.....	.....	4.55	6.1	6.0	4.45	4.15	4.0	4.0	4.0	3.95	5.4
29	.....	.....	4.5	6.0	6.6	4.45	4.2	4.0	4.0	4.0	3.95	5.8
30	.....	.....	4.45	6.0	6.7	4.45	4.15	4.0	4.0	4.0	3.95	5.3
31	.....	.....	4.4	.....	6.7	.....	4.1	4.0	.....	4.0	.....	5.1

NOTE.—Relation of gage height to discharge probably affected by ice during January and February and from Dec. 15 to 31; stream filled with ice after Dec. 15.

Daily discharge, in second-feet, of Weber River near Oakley, Utah, for 1910.

[Drainage area, 163 square miles.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			80	205	855	1,790	190	120	74	74	74	65
2			85	222	685	1,690	174	96	74	74	74	65
3			96	240	568	1,330	174	96	74	85	70	65
4			105	222	568	1,180	165	96	74	85	65	65
5			114	240	568	1,020	160	96	74	85	65	74
6			124	240	596	878	160	96	65	74	65	96
7			133	240	625	878	160	85	65	74	65	80
8			130	278	685	811	160	85	65	74	65	65
9			125	320	878	779	146	74	65	74	65	65
10			120	364	1,090	747	146	74	65	74	65	65
11			126	412	1,330	625	146	74	65	74	65	.....
12			132	462	1,330	625	146	108	65	74	65	.....
13			138	514	1,250	568	133	74	65	85	65	.....
14			146	412	1,250	514	133	74	65	85	65	.....
15			146	364	1,250	462	160	74	65	74	65	.....
16			146	344	1,020	437	146	74	74	85	65	.....
17			155	375	885	412	146	74	80	96	65	.....
18			165	412	747	388	133	74	85	96	65	.....
19			174	462	811	364	133	74	85	96	65	.....
20			190	488	811	342	190	74	74	85	74	.....
21			320	514	747	320	146	74	74	85	74	.....
22			412	568	685	299	133	74	74	85	74	.....
23			364	685	747	278	120	74	74	85	74	.....
24			320	747	811	259	120	74	74	85	74	.....
25			278	878	1,020	240	108	74	74	85	74	.....
26			240	1,020	1,020	222	108	74	74	74	74	.....
27			240	1,090	948	205	108	74	74	74	74	.....
28			222	1,090	1,020	190	108	74	74	74	65	.....
29			205	1,020	1,510	190	120	74	74	74	65	.....
30			190	1,020	1,600	190	108	74	74	74	65	.....
31			174	.....	1,600	.....	96	74	.....	74	.....	.....

NOTE.—Daily discharge determined from a discharge rating curve that is fairly well defined. Discharge interpolated for days of missing gage heights during open season.

Monthly discharge of Weber River near Oakley, Utah, for 1910.

[Drainage area, 163 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	.....	.....	85	0.521	0.60	5,230	D.
February	.....	.....	75	.460	.48	4,160	D.
March	412	*a* 80	180	1.10	1.27	11,100	C.
April	1,090	205	515	3.16	3.53	30,600	B.
May	1,600	568	952	5.84	6.73	58,500	B.
June	1,790	190	608	3.73	4.16	36,200	B.
July	190	96	141	.865	1.00	8,670	A.
August	120	74	80.8	.496	.57	4,970	A.
September	85	65	71.9	.441	.49	4,280	A.
October	96	74	80.4	.493	.57	4,940	A.
November	74	65	68.2	.418	.47	4,060	A.
December	96	*a* 50	58.2	.357	.41	3,580	C.
The year	1,790	*a*50	244	1.50	20.28	176,000	

a Estimated.

NOTE.—Discharge for periods during which ice was present estimated from climatologic records and observer's notes in regard to ice. Mean discharge Dec. 11 to 31 estimated at 50 second-feet.

WEBER RIVER AT DEVILS SLIDE, UTAH.[1]

This station, which is located one-fourth mile upstream from the Oregon Short Line Railroad bridge at the town of Devils Slide, about 1½ miles west of Croyden and 10 miles below Echo, Utah, was established February 1, 1905, to determine the amount of water available for storage in the Henefer basin, about 2 miles above, in connection with the proposed Weber River project.

Lost Creek enters the Weber about one-fourth mile above the station and Chalk Creek about 15 miles above. Water is diverted above the station only for irrigation in the narrow valleys and in Kamas Prairie.

The gage is a staff; its datum has remained unchanged since the station was established.

Discharge measurements are made from a cable and car.

The river never freezes over at the station, and the relation between gage height and discharge is not seriously affected by the slush ice that runs at times. The channel shifts somewhat, but the conditions under which observations are made are fairly good. The flow is not affected by artificial control above or below the station, and the records may be considered good.

Discharge measurements of Weber River at Devils Slide, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq.ft.*	*Feet.*	*Sec.-ft.*
Aug. 6	G. H. Canfield	92	77	2.17	126
6	.....do	94	77	2.17	124
Sept. 6	.....do	92	62	2.04	89
Oct. 7	.....do	94	79	2.21	142
Dec. 7	J. C. Dort	102	94	2.40	192

[1] Station formerly described as "Weber River near Croyden."

Daily gage height, in feet, for Weber River at Devils Slide, Utah, for 1910.

[E. T. Crouch, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.3	2.3	3.1	3.8	4.9	4.0	2.3	2.3	2.2	2.2	2.4	2.4
2	2.3	2.3	3.4	3.8	4.9	3.9	2.3	2.3	2.2	2.2	2.4	2.4
3	2.3	2.3	3.6	3.9	4.6	3.9	2.3	2.3	2.2	2.2	2.4	2.4
4	2.3	2.3	3.8	3.9	4.5	3.9	2.3	2.3	2.1	2.2	2.4	2.4
5	2.3	2.3	4.0	4.0	4.2	3.9	2.3	2.2	2.1	2.2	2.4	2.4
6	2.3	2.4	4.0	4.0	4.2	3.8	2.3	2.2	2.1	2.2	2.4	2.4
7	2.3	2.4	4.0	4.1	4.3	3.6	2.3	2.2	2.1	2.2	2.4	2.4
8	2.3	2.4	3.9	4.2	4.5	3.6	2.3	2.2	2.1	2.2	2.4	2.4
9	2.3	2.4	3.9	4.2	4.5	3.4	2.3	2.2	2.1	2.3	2.4	2.4
10	2.3	2.4	3.9	4.5	4.7	3.2	2.3	2.2	2.1	2.3	2.4	2.5
11	2.3	2.4	3.9	4.5	4.7	3.2	2.3	2.2	2.1	2.3	2.4	2.6
12	2.3	2.4	3.9	4.8	4.8	3.1	2.3	2.2	2.1	2.3	2.4	2.6
13	2.3	2.4	4.0	5.0	4.8	3.0	2.3	2.2	2.1	2.3	2.4	2.5
14	2.3	2.4	4.0	5.0	4.8	2.9	2.3	2.2	2.1	2.3	2.4	2.5
15	2.3	2.4	4.1	5.0	4.0	2.9	2.3	2.2	2.1	2.3	2.4	2.4
16	2.3	2.4	4.2	5.1	4.0	2.9	2.3	2.2	2.1	2.4	2.4	2.4
17	2.3	2.4	4.2	4.8	3.9	2.8	2.3	2.2	2.1	2.4	2.4	2.4
18	2.3	2.4	4.2	4.8	3.8	2.8	2.3	2.2	2.2	2.4	2.4	2.4
19	2.3	2.4	4.2	4.6	3.6	2.8	2.3	2.2	2.2	2.4	2.4	2.4
20	2.4	2.4	4.2	4.6	3.6	2.5	2.3	2.2	2.2	2.4	2.4	2.4
21	2.4	2.4	4.2	4.7	3.5	2.4	2.3	2.2	2.2	2.4	2.4	2.4
22	2.4	2.5	4.0	4.7	3.4	2.4	2.3	2.2	2.2	2.4	2.4	2.4
23	2.4	2.5	4.0	4.7	3.5	2.4	2.3	2.2	2.2	2.4	2.4	2.4
24	2.4	2.5	4.0	4.9	3.5	2.4	2.3	2.2	2.2	2.4	2.4	2.4
25	2.4	2.4	3.9	4.9	3.6	2.4	2.3	2.2	2.2	2.4	2.4	2.4
26	2.4	2.4	3.9	5.0	3.6	2.4	2.3	2.2	2.2	2.4	2.4	2.4
27	2.4	2.4	3.9	5.1	3.7	2.4	2.3	2.2	2.2	2.4	2.4	2.4
28	2.4	2.5	3.9	5.2	3.9	2.3	2.3	2.2	2.2	2.4	2.4	2.4
29	2.4	.....	3.8	5.1	4.0	2.3	2.3	2.2	2.2	2.4	2.4	2.4
30	2.3	.....	3.8	5.0	4.0	2.3	2.3	2.2	2.2	2.4	2.4	2.4
31	2.3	.....	3.8	.....	4.0	.....	2.3	2.2	.....	2.4	.....	2.4

Daily discharge, in second-feet, for Weber River at Devils Slide, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	305	305	713	1,210	1,890	1,100	160	160	132	132	190	190
2	305	305	905	1,210	1,890	1,020	160	160	132	132	190	190
3	305	305	1,050	1,300	1,610	1,020	160	160	132	132	190	190
4	305	305	1,210	1,300	1,520	1,020	160	160	106	132	190	190
5	305	305	1,380	1,380	1,260	1,020	160	132	106	132	190	190
6	305	349	1,380	1,380	1,260	950	160	132	106	132	190	190
7	305	349	1,380	1,470	1,340	810	160	132	106	132	190	190
8	305	349	1,300	1,550	1,520	810	160	132	106	132	190	190
9	305	349	1,300	1,550	1,520	680	160	132	106	160	190	190
10	305	349	1,300	1,830	1,700	560	160	132	106	160	190	225
11	305	349	1,300	1,830	1,700	560	160	132	106	160	190	265
12	305	349	1,300	2,110	1,790	500	160	132	106	160	190	265
13	305	349	1,380	2,320	1,790	450	160	132	106	160	190	225
14	305	349	1,380	2,320	1,790	400	160	132	106	160	190	225
15	305	349	1,470	2,320	1,100	400	160	132	106	160	190	190
16	305	349	1,550	2,440	1,100	400	160	132	106	190	190	190
17	305	349	1,550	2,110	1,020	350	160	132	106	190	190	190
18	305	349	1,550	2,110	950	350	160	132	132	190	190	190
19	305	349	1,550	1,920	810	350	160	132	132	190	190	190
20	349	349	1,550	1,920	810	225	160	132	132	190	190	190
21	349	349	1,550	2,020	740	190	160	132	132	190	190	190
22	349	395	1,380	2,020	680	190	160	132	132	190	190	190
23	349	395	1,380	2,020	740	190	160	132	132	190	190	190
24	349	395	1,380	2,220	740	190	160	132	132	190	190	190
25	349	349	1,300	2,220	810	190	160	132	132	190	190	190
26	349	349	1,300	2,320	810	190	160	132	132	190	190	190
27	349	349	1,300	2,440	880	190	160	132	132	190	190	190
28	349	395	1,300	2,550	1,020	160	160	132	132	190	190	190
29	349	.....	1,210	2,090	1,100	160	160	132	132	190	190	190
30	305	.....	1,210	1,990	1,100	160	160	132	132	190	190	190
31	305	.....	1,210	.....	1,100	.....	160	132	.....	190	.....	190

NOTE.—Daily discharge determined from two fairly well-defined discharge rating curves, one applicable from Jan. 1, 1909, to Apr. 27, 1910, and the other applicable from Apr. 28 to Dec. 31, 1910.

Monthly discharge of Weber River at Devils Slide, Utah, for 1910.

[Drainage area, 1,090 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	349	305	319	0.293	0.34	19,600	B.
February	395	305	348	.319	.33	19,300	B.
March	1,550	713	1,320	1.21	1.40	81,200	B.
April	2,550	1,210	1,920	1.76	1.96	114,000	B.
May	1,890	740	1,230	1.13	1.30	75,600	B.
June	1,100	160	493	.452	.50	29,300	A.
July	160	160	160	.147	.17	9,840	A.
August	160	132	136	.125	.14	8,360	A.
September	132	106	120	.110	.12	7,140	A.
October	190	132	168	.154	.18	10,300	A.
November	190	190	190	.174	.19	11,300	A.
December	265	190	198	.182	.21	12,200	A.
The year	2,550	106	550	.505	6.84	398,000	

NOTE.—Accuracy somewhat uncertain from about January to May, 1910, as no discharge measurements were made between July, 1909, and August, 1910.

WEBER RIVER NEAR PLAIN CITY, UTAH.

This station, which is located at the highway bridge on the main road to Plain City and West Weber, about 10 miles northwest of Ogden, Utah, and about 6 miles above the mouth of the river, was established in 1903 under the direction of the State engineer and was maintained by the State until May 14, 1905, when it was taken over by the United States Geological Survey, by whom it has since been maintained in cooperation with the State.

As the station is below all diversions and all tributaries—Ogden River entering about 8 miles above—the records show the total amount of water discharged into Great Salt Lake and will be valuable in the adjudication of water rights on the Ogden and Weber rivers.

Discharge measurements are made from the bridge. The upstream face of the center bridge pier is graduated, marked with white paint, and forms the gage.

The records are very little affected by ice, although the river freezes at times near the station. There is no effect from artificial control above or below the station, and as the bed of the stream changes only slightly the records may be considered excellent.

Discharge measurements of Weber River near Plain City, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 27[a]	E. S. Fuller			2.40	16
Dec. 10	J. C. Dort	114	272	4.96	480

a Wading measurement about 300 feet below the bridge.

Daily gage height, in feet, of Weber River near Plain City, Utah, for 1910.

[W. E. Davies, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.2	6.0	7.4	11.1	.....	8.0	2.4	2.2	2.1	3.8	4.5	4.8
2	14.0	6.0	8.9	11.7	.....	7.5	2.4	2.2	2.1	4.1	4.5	4.8
3	10.2	6.2	11.9	12.3	.....	7.7	2.3	2.2	2.1	4.1	4.5	4.8
4	10.0	6.3	12.5	12.1	.....	7.8	2.3	2.2	2.1	4.1	4.7	4.7
5	9.7	6.5	14.1	11.5	11.6	6.9	2.3	2.2	2.1	4.3	4.7	4.8
6	9.5	6.7	13.5	11.9	12.2	6.7	2.3	2.2	2.1	4.6	4.4	4.8
7	9.1	6.6	13.1	12.4	11.6	6.6	2.3	2.2	2.1	4.5	4.4	4.7
8	8.2	6.6	12.8	12.7	11.0	6.1	2.3	2.2	2.5	3.9	4.3	4.7
9	8.5	6.4	13.0	13.1	11.0	6.0	2.3	2.2	2.5	3.9	4.5	4.7
10	8.4	6.2	12.3	13.7	11.2	5.9	2.3	2.2	2.5	4.1	4.6	5.1
11	8.1	6.1	11.8	13.4	12.0	5.4	2.3	2.2	2.5	3.9	4.6	5.1
12	8.0	6.0	11.3	13.4	11.9	5.1	2.3	2.2	2.5	4.0	4.6	5.5
13	7.7	6.0	11.6	13.1	12.0	4.8	2.3	2.2	2.3	4.0	4.5	5.3
14	7.4	6.0	12.1	13.1	11.8	4.0	2.3	2.2	2.3	4.0	4.5	4.9
15	7.2	5.9	12.3	13.0	11.6	3.5	2.3	2.2	2.3	4.0	4.5	4.8
16	6.9	5.9	12.8	13.1	11.2	3.3	2.3	2.2	2.3	4.1	4.6	4.6
17	6.8	5.8	13.3	13.1	10.4	3.3	2.3	2.2	2.3	4.1	4.7	4.6
18	6.7	5.8	13.6	13.0	8.6	3.0	2.3	2.2	2.3	4.2	4.7	4.6
19	6.7	5.7	14.2	12.8	8.4	3.1	2.3	2.1	2.5	4.5	4.8	4.8
20	6.6	5.6	15.1	12.9	8.0	3.0	2.3	2.1	2.5	4.6	4.7	4.8
21	6.5	5.6	15.7	13.2	7.8	2.9	2.3	2.1	2.6	4.6	4.7	4.7
22	6.4	5.5	16.2	13.7	7.7	2.7	2.3	2.1	3.0	4.6	4.7	4.6
23	6.4	5.5	16.9	13.9	7.6	2.6	2.2	2.1	3.3	4.6	4.8	4.6
24	6.3	5.4	16.3	14.1	7.3	2.6	2.2	2.1	3.4	4.5	4.8	4.8
25	6.3	5.6	15.1	14.5	7.0	2.5	2.2	2.1	3.3	4.5	4.8	4.6
26	6.2	5.8	14.3	14.7	7.3	2.5	2.2	2.1	3.2	4.5	4.8	4.5
27	6.2	6.1	13.9	14.9	7.0	2.5	2.2	2.1	3.2	4.5	4.8	4.5
28	6.2	6.7	13.3	15.2	7.0	2.4	2.2	2.1	3.4	4.5	4.8	4.5
29	6.1	.....	12.9	15.8	7.1	2.4	2.2	2.1	3.6	4.5	4.7	4.6
30	6.1	.....	11.6	15.9	7.7	2.4	2.2	2.1	3.8	4.5	4.7	4.3
31	6.0	.....	11.3	.....	7.9	.....	2.2	2.1	.....	4.5	.....	4.5

Daily discharge, in second-feet, of Weber River near Plain City, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,310	628	1,040	2,420	4,160	1,400	16	8	5	226	370	438
2	3,690	628	1,560	2,660	3,820	1,220	16	8	5	286	370	438
3	2,060	680	2,750	2,920	3,480	1,290	12	8	5	286	370	438
4	1,980	767	3,000	2,830	3,140	1,330	12	8	5	286	414	414
5	1,860	762	3,690	2,580	2,810	1,020	12	8	5	326	414	438
6	1,780	820	3,430	2,750	3,060	956	12	8	5	392	348	438
7	1,640	790	3,250	2,960	2,810	926	12	8	5	370	348	414
8	1,310	790	3,130	3,080	2,560	778	12	8	22	246	326	414
9	1,420	734	3,210	3,250	2,560	750	12	8	22	246	370	414
10	1,380	680	2,920	3,520	2,640	722	12	8	22	286	392	512
11	1,280	654	2,710	3,390	2,980	590	12	8	22	246	392	512
12	1,240	628	2,500	3,390	2,940	512	12	8	22	266	392	616
13	1,140	628	2,620	3,250	2,980	438	12	8	12	266	370	564
14	1,040	628	2,830	3,250	2,900	266	12	8	12	266	370	462
15	974	602	2,920	3,210	2,810	172	12	8	12	266	370	438
16	880	602	3,130	3,250	2,640	136	12	8	12	286	392	392
17	850	576	3,340	3,250	2,320	136	12	8	12	286	414	392
18	820	576	3,470	3,210	1,620	88	12	8	12	306	414	392
19	820	550	3,740	3,130	1,540	104	12	5	22	370	438	438
20	790	525	4,130	3,170	1,400	88	12	5	22	392	414	438
21	762	525	4,400	3,300	1,330	72	12	5	32	392	414	414
22	734	500	4,660	3,520	1,290	44	12	5	88	392	414	392
23	734	500	5,130	3,610	1,260	32	8	5	136	392	438	392
24	707	475	4,720	3,690	1,150	32	8	5	154	370	438	438
25	707	525	4,130	3,870	1,050	22	8	5	136	370	438	392
26	680	576	3,780	3,960	1,150	22	8	5	120	370	438	370
27	680	654	3,610	4,050	1,050	22	8	5	120	370	438	370
28	680	820	3,340	4,180	1,050	16	8	5	154	370	438	370
29	654	.....	3,170	4,450	1,080	16	8	5	190	370	414	392
30	654	.....	2,620	4,500	1,290	16	8	5	226	370	414	326
31	628	.....	2,500	.....	1,360	.....	8	5	.....	370	.....	370

NOTE.—Daily discharge determined from two well-defined discharge rating curves, one applicable from June 1, 1909, to Apr. 30, 1910, and the other from May 1 to Dec. 31, 1910. Discharge May 1 to 4 interpolated.

Monthly discharge of Weber River near Plain City, Utah, for 1910.

[Drainage area, 2,060 square miles.]

Months.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	3,690	628	1,160.	0.563	0.65	71,300	B.
February	820	475	634.	.308	.32	35,200	B.
March	5,130	1,040	3,270.	1.59	1.83	201,000	B.
April	4,500	2,420	3,350.	1.63	1.82	199,000	B.
May	4,160	1,050	2,200.	1.07	1.23	135,000	A.
June	1,400	16	441.	.214	.24	26,200	A.
July	16	8	11.1	.0054	.006	682	C.
August	8	5	6.7	.0033	.004	412	D.
September	226	5	53.9	.026	.03	3,210	B.
October	392	226	324.	.157	.18	19,900	A.
November	438	326	399.	.194	.22	23,700	A.
December	616	326	427.	.207	.24	26,300	A.
The year	5,130	5	1,030.	.500	6.77	742,000	

OGDEN RIVER NEAR OGDEN, UTAH.

This station, which is located at the dam of the Utah Light & Power Co., 2½ miles above the terminus of the Ogden Canyon Electric Railway and about 8 miles from Ogden post office, in the NW. ¼ SW. ¼ sec. 16, T. 6 N., R. 1 E., Salt Lake base and meridian, was established by the Utah Light & Railway Co. in January, 1904.

The discharge is measured by a weir consisting of eleven 5-foot openings, each opening crested as a separate weir. The Francis weir formula is used in the computations. The water diverted through the power plant is measured by two Venturi meters, each having a 24-inch throat. At the mouth of the canyon is a waste pipe, the capacity of which is taken into consideration in the company's records.

The height of the water surface above the crest of the weir openings is determined by a hook gage; an automatic gage is used in connection with the two Venturi meters, located in the pipe line just above the power house.

Records are furnished by Mr. Frank Carr, of the Utah Light & Railway Co. The few minor changes in the figures showing monthly discharge have been made by engineers of the United States Geological Survey.

Daily discharge, in second-feet, of Ogden River near Ogden, Utah, for 1904–1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
1	48.9	54.4	236.6	490.2	1,184.5	558.6	129.9	55.4	59.6	52.9	65 1	61.0
2	49.4	55.3	289.7	490.5	1,105.8	616.9	122.4	57.8	58.9	51.3	67.0	61.5
3	47.4	58.0	227.0	573.9	1,288.0	598.9	114.5	55.8	59.3	51.4	66.3	57.2
4	47.1	58.0	252.1	580.5	1,425.5	544.9	112.0	53.5	52.2	54.3	65.9	51.1
5	48.0	58.0	221.5	685.8	1,205.8	500.5	109.2	50.4	54.7	57.0	66.2	48.0
6	50.8	62.9	231.1	666.0	1,496.0	471.6	108.0	52.6	47.6	58.9	65.7	48.2
7	52.8	65.2	302.5	626.8	1,758.4	450.8	107.4	50.4	41.7	59.7	65.2	49.2
8	52.0	63.4	383.1	583.1	1,413.1	403.8	107.6	50.3	41.0	57.0	65.6	50.4
9	50.6	60.8	421.9	603.3	1,287.9	403.3	107.1	49.1	40.3	57.0	64.1	51.2
10	51.4	58.9	401.2	693.7	1,454.1	361.4	95.8	49.9	41.4	61.1	64.1	57.6
11	54.4	65.1	416.1	804.6	1,536.2	330.2	86.1	62.7	39.3	60.0	63.6	58.7
12	57.6	65.4	308.8	1,005.1	1,406.3	294.4	89.7	63.3	45.7	67.9	63.3	58.0
13	56.2	65.5	301.4	1,111.1	1,425.5	256.2	95.5	72.4	46.5	65.5	60.9	89.2
14	55.6	65.4	308.8	1,215.1	1,473.6	245.0	86.7	62.8	47.7	62.7	60.4	61.1
15	56.1	69.3	399.7	1,418.3	1,829.9	244.5	86.8	59.0	48.6	61.8	60.2	56.2
16	55.5	77.3	396.2	1,373.7	1,477.9	236.3	85.3	56.5	47.3	71.1	61.0	55.0
17	52.0	79.8	337.8	1,200.2	1,403.6	226.7	81.6	67.4	49.0	70.0	60.9	52.2
18	51.0	68.3	458.7	1,123.1	1,370.5	216.8	80.3	63.2	49.3	70.0	60.6	57.5
19	57.9	70.0	629.7	1,214.5	1,417.4	197.8	78.0	74.6	47.9	66.4	60.6	59.9
20	54.6	73.3	643.3	1,435.4	1,304.3	203.1	80.2	48.5	48.8	67.2	59.1	59.3
21	56.8	74.8	592.6	1,380.3	1,252.3	201.0	78.4	52.6	48.0	67.7	59.5	58.8
22	61.0	152.6	495.4	1,158.1	1,217.8	179 2	74 1	54.9	45.6	67.9	59.2	61.8
23	57.7	285.5	532.6	1,116.6	1,218.2	167.3	71.0	73.0	45.9	64 5	58.8	63.3
24	55.2	350.5	540.6	822.4	1,203.3	158.6	68.5	68.3	45.3	67.4	59.3	63.2
25	55.3	468.0	447.7	793.1	1,260.8	163.1	65.3	64.7	42.1	69.1	59.3	57.3
26	55.8	602.7	375.4	856.5	1,105.9	160.6	56.0	66.1	45.0	68.3	59.3	50.9
27	56.0	375.5	374.3	1,084.8	966.1	146.2	55.5	69.7	45.1	67.9	59.3	42.7
28	55.3	255.5	394.7	1,257.6	890.0	134.8	54.1	61.7	47.7	68.4	59.5	48.4
29	55.8	243.6	691.8	1,186.0	783.0	127.3	60.6	65.7	50.2	68.0	59.9	52.2
30	56.8	.....	647.5	1,141.8	701.2	122.7	56.0	59.2	53.9	65.6	59.9	52.7
31	56.8	.....	569.0	.....	717.5	.....	55.4	62.5	.....	64.4	.....	56.1
1905.												
1	52.0	85.7	78.1	160.9	681.5	335.6	82.6	49.7	50.7	50.7	49.9	50.1
2	47.1	92.0	80.3	159.4	762.2	294.4	81.4	49.2	50.2	50.2	50.5	50.1
3	44.2	86.4	86.3	156.7	695.2	267.5	82.8	48.9	50.0	50.0	50.7	49.4
4	43.5	82.5	93.6	153.9	603.8	252.9	75.0	49.0	50.8	50.8	50.6	47.3
5	42.9	76.2	95.3	153.6	549.9	233.7	73.0	51.6	50.9	50.9	49.3	42.3
6	42.5	73.1	100.8	157.4	513.7	185.1	72.6	52.0	50.0	50.0	48.9	41.7
7	42.5	70.0	121.5	174.6	498.1	159.4	71.5	50.7	49.5	49.5	49.3	40.7
8	42.9	69.3	121.4	208.2	540.5	130.4	73.6	50.3	48.6	48.6	49.0	40.5
9	42.0	70.1	121.9	239.6	602.8	116.9	74.5	50.9	48.9	48.9	49.8	40.4
10	41.5	70.2	124.1	293.1	536.9	116.9	79.5	49.8	48.2	48.2	49.7	40.2
11	42.1	70.0	126.5	255.2	516.8	113.4	68.4	48.6	47.5	47.5	48.2	40.1
12	43.4	57.2	127.5	218.6	513.9	111.1	68.1	47.7	45.6	45.6	47.8	40.6
13	43.1	59.1	129.5	212.5	513.9	108.4	67.3	46.8	44.3	44.3	48.1	40.2
14	44.5	60.9	135.6	231.6	535.8	105.0	71.9	46.2	42.2	42.2	48.5	40.0
15	45.9	61.4	136.0	242.2	541.6	104.2	82.7	45.8	42.9	42.9	48.7	39.8
16	49.7	62.4	137.2	368.0	553.5	103.5	71.6	44.9	45.4	45.4	48.8	39.9
17	62.6	62.4	132.1	332.1	679.2	125.2	71.0	47.3	45.9	45.9	50.7	40.2
18	63.7	59.4	127.2	312.9	785.2	134.2	68.5	48.9	47.8	47.8	50.6	42.0
19	64.4	59.0	162.1	353.6	766.2	126.4	66.0	50.0	48.7	48.7	50.1	43.5
20	65.7	60.8	159.1	397.5	783.1	108.2	66.4	50.7	48.3	48.3	51.8	43.7
21	67.5	64.1	153.0	368.9	779.9	101.5	63.6	45.6	47.4	47.4	53.9	44.0
22	69.6	67.3	144.6	354.8	718.9	96.6	63.0	50.7	46.9	46.9	52.0	43.2
23	70.3	69.6	138.1	379.2	679.5	94.2	61.9	53.3	46.9	46.9	52.0	42.5
24	70.0	70.0	154.5	442.6	612.6	93.5	60.2	55.8	47.0	47.0	52.0	43.0
25	68.8	70.1	155.3	489.6	600.7	90.0	56.2	58.6	48.1	48.1	51.6	43.1
26	68.0	70.8	160.4	585.3	585.1	85.6	54.8	72.9	50.6	50.6	52.3	44.0
27	68.9	74.1	199.2	594.1	551.8	81.0	52.8	57.0	49.1	49.1	52.6	44.6
28	67.5	78.4	180.2	606.6	531.0	81.8	54.1	67.4	49.2	49.2	52.3	45.2
29	67.0	.....	178.5	579.4	449.5	81.8	53.1	57.8	49.5	49.5	51.5	46.1
30	67.5	.....	175.4	573.5	398.0	81.8	52.3	63.5	49.1	49.1	51.2	45.6
31	76.5	.....	168.3	.....	367.0	.....	52.0	60.0	.....	49.7	.....	45.7

Daily discharge, in second-feet, of Ogden River near Ogden, Utah, for 1904–1909—Contd.

Days.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.												
1	45.2	50.0	73.7	759.3	675.5	1,307.7	.....	.....	114.3	64.3	79.8	53.1
2	45.0	50.1	77.2	610.8	616.0	1,141.1	.....	.....	110.0	62.2	74.9	52.2
3	45.0	49.8	73.0	472.7	585.5	1,115.0	.....	.....	96.0	62.6	77.4	69.0
4	45.4	48.4	71.7	408.7	1,039.6	1,035.4	.....	.....	90.2	76.9	78.4	83.5
5	45.4	48.9	69.6	384.7	1,075.1	998.4	.....	.....	97.4	65.9	78.4	79.7
6	45.3	48.5	69.0	390.9	1,000.2	1,093.4	.....	.....	92.4	70.2	83.7	77.6
7	44.2	48.2	69.0	468.2	1,017.0	1,085.9	.....	.....	86.8	70.4	78.5	71.9
8	44.1	49.1	69.2	545.3	934.0	951.6	.....	.....	90.7	70.2	79.6	77.0
9	44.3	50.5	77.1	623.7	941.4	863.3	.....	.....	84.2	67.	80.8	78.7
10	44.3	51.7	90.6	705.6	1,071.0	799.3	.....	.....	89.4	65.7	75.0	68.9
11	45.6	52.5	101.8	700.2	1,066.0	792.4	.....	.....	83.4	66.3	74.0	65.5
12	46.0	53.5	132.4	592.9	1,103.0	729.9	.....	.....	76.7	68.5	78.4	96.7
13	46.5	55.5	225.5	512.0	1,067.0	692.4	.....	.....	88.5	68.4	78.7	86.1
14	56.7	57.9	182.1	512.2	964.2	610.9	.....	.....	92.5	66.9	80.2	69.7
15	48.9	62.1	151.0	570.0	1,060.6	535.9	.....	.....	98.2	69.7	78.9	70.8
16	47.7	63.2	121.8	637.6	844.0	487.8	.....	.....	90.6	69.4	80.5	63.4
17	50.0	63.2	117.5	746.0	684.5	443.3	.....	.....	89.9	69.9	81.0	66.7
18	56.2	63.3	114.6	831.5	709.3	398.0	.....	.....	85.5	70.2	74.2	73.8
19	76.0	64.0	106.4	844.1	659.8	350.7	.....	.....	81.4	70.8	72.6	73.3
20	68.9	66.2	109.3	852.4	679.2	274.6	.....	.....	75.7	71.0	75.2	80.0
21	57.3	68.7	113.7	903.9	745.9	250.3	.....	.....	77.6	70.7	63.8	76.3
22	55.5	70.7	128.2	970.7	745.6	236.8	.....	.....	78.6	72.4	62.4	75.9
23	53.8	65.0	148.3	1,006.3	717.3	233.7	.....	.....	76.5	71.2	57.8	75.9
24	53.0	61.0	299.7	1,050.8	689.6	208.8	.....	.....	77.3	70.4	56.7	75.3
25	52.8	63.4	726.2	929.3	597.6	180.5	.....	.....	77.0	70.3	56.7	70.8
26	53.6	65.2	803.2	787.4	685.1	184.5	.....	.....	74.3	70.1	73.8	92.6
27	55.2	67.1	785.0	679.2	857.4	170.0	.....	.....	75.2	71.8	67.3	78.7
28	55.8	71.7	647.4	637.3	1,113.5	309.1	.....	.....	73.9	70.7	66.3	86.7
29	53.0	.....	596.1	640.2	1,124.6	239.4	.....	.....	76.9	72.2	69.1	92.2
30	52.2	.....	574.2	642.4	1,349.5	198.9	.....	.....	69.3	71.8	56.7	93.0
31	51.2	.....	667.0	.....	1,316.7	.....	.....	.....	.....	75.2	.....	90.6
1907.												
1	81.3	105.3	330.1	704.4	1,414.7	1,227.7	284.5	105.6	91.9	84.8	93.4	84.6
2	80.9	129.6	356.5	854.9	1,463.5	1,251.0	280.9	107.1	85.4	84.8	93.2	84.2
3	81.3	319.5	337.6	1,461.0	1,270.8	1,521.7	288.0	111.9	85.5	84.8	90.5	83.4
4	83.4	1,169.3	299.0	1,423.2	1,262.0	1,334.7	271.2	103.9	87.7	84.8	81.3	82.3
5	87.2	3,257.2	291.5	1,812.3	1,171.8	1,329.2	261.2	110.3	97.7	84.8	78.1	82.0
6	83.9	2,313.3	317.0	1,675.3	1,048.4	1,335.5	253.3	93.1	85.1	84.8	83.8	88.8
7	80.2	1,055.0	390.2	1,793.6	1,045.9	1,385.1	262.1	109.9	84.8	77.8	90.7	94.2
8	76.1	630.3	374.6	1,727.6	1,096.0	1,441.8	247.4	96.3	84.8	74.6	89.4	116.3
9	67.8	454.1	361.4	1,591.2	1,366.8	1,300.0	246.9	87.1	84.7	73.9	87.3	86.2
10	70.1	375.6	352.7	1,744.0	1,462.0	1,098.9	242.7	86.9	84.7	69.0	91.5	83.8
11	76.7	291.5	322.5	1,976.6	2,251.3	1,057.1	238.6	96.6	90.3	72.3	93.3	94.5
12	87.9	304.0	336.1	2,134.8	2,013.2	1,076.8	246.6	88.6	92.3	76.0	99.4	86.9
13	84.9	266.9	286.5	2,134.8	1,533.5	1,038.6	213.4	89.7	91.1	77.8	100.0	89.5
14	88.4	257.9	257.1	2,566.4	1,304.1	995.1	200.3	85.3	87.2	107.0	98.8	89.5
15	83.7	253.3	227.7	2,835.4	1,148.2	817.6	191.5	89.5	87.6	87.2	105.8	77.5
16	85.3	268.8	241.3	2,631.0	1,272.8	767.4	187.2	89.0	80.7	86.2	96.8	77.5
17	86.7	277.7	384.3	2,361.0	1,317.8	737.9	185.1	91.9	80.1	85.5	91.2	76.8
18	83.2	296.8	588.0	2,253.8	1,709.2	663.7	188.4	92.1	82.5	92.1	88.0	72.9
19	77.2	289.0	1,136.0	1,831.8	1,905.5	658.6	169.6	87.3	82.9	92.7	85.0	73.1
20	74.6	338.5	2,298.8	1,579.7	2,183.8	599.3	167.0	76.4	81.5	85.6	89.8	66.1
21	72.9	345.9	2,862.8	1,337.8	2,155.7	590.1	150.9	81.2	86.9	87.2	94.9	67.2
22	72.8	454.9	2,292.9	1,197.4	1,945.2	587.7	148.9	80.2	89.6	80.7	101.4	66.1
23	70.2	966.5	1,749.9	1,197.4	1,771.0	550.6	138.3	81.2	91.0	77.3	92.5	81.8
24	70.5	748.3	1,475.4	1,197.4	1,763.8	515.3	136.7	95.1	90.3	76.9	85.3	88.3
25	69.8	562.3	1,262.4	1,197.4	1,554.1	484.1	133.4	112.9	91.7	96.8	84.5	84.3
26	70.7	573.5	1,193.5	1,243.5	1,257.7	415.3	128.2	92.8	84.8	107.6	85.9	122.6
27	86.1	466.5	1,025.8	1,407.6	1,080.3	388.0	117.1	92.1	84.8	107.7	82.8	102.7
28	87.9	372.1	851.3	1,553.2	1,008.3	352.4	110.0	89.0	84.8	98.3	85.8	100.9
29	90.6	.....	773.9	1,545.5	1,007.6	317.4	97.5	96.7	84.8	88.2	85.6	71.2
30	89.9	.....	754.8	1,481.4	934.3	299.6	97.0	115.5	84.8	85.4	86.4	98.0
31	93.3	.....	655.2	.....	1,030.0	.....	109.5	119.5	.....	106.6	.....	88.7

NOTE.—Daily discharge for July and August, 1906, not determined, but an estimate of the monthly mean discharge has been made by the Utah Light & Ry. Co.

Daily discharge, in second-feet, of Ogden River near Ogden, Utah, for 1904–1909—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	80.0	65.8	81.4	122.9	293.2	626.8	164.2	79.5	68.7	66.2	82.1	75.7
2	79.1	70.6	82.1	127.5	303.5	447.4	153.3	73.2	66.5	74.0	83.6	74.5
3	79.0	70.2	86.2	133.6	337.3	662.6	138.4	71.9	67.9	83.2	78.8	79.0
4	64.7	72.7	92.2	136.1	406.4	634.3	113.6	66.8	60.9	103.2	79.3	84.8
5	61.9	75.2	88.0	143.4	352.5	935.4	117.8	72.0	59.6	115.5	81.8	87.6
6	67.4	78.9	89.7	151.7	339.0	827.7	119.0	78.7	57.9	82.4	83.7	82.1
7	64.9	79.2	86.0	155.0	326.6	768.2	117.2	75.4	57.4	71.9	81.8	80.5
8	66.5	75.7	75.1	153.1	348.8	757.3	117.6	69.0	68.3	68.7	82.7	78.2
9	66.5	72.2	78.9	154.4	350.6	783.1	114.5	75.0	65.1	64.1	84.2	86.3
10	66.5	69.2	84.7	176.7	328.4	779.2	99.3	90.3	59.7	64.7	84.3	86.7
11	77.9	75.7	79.3	180.3	312.2	745.3	108.7	85.1	61.4	63.2	82.9	82.9
12	77.8	76.2	80.9	217.0	295.9	717.9	101.3	89.8	71.5	62.3	82.3	85.5
13	75.0	76.3	96.2	259.5	336.6	643.0	106.4	94.5	61.9	57.1	82.3	89.5
14	75.7	74.6	123.6	318.9	300.8	620.1	101.3	86.9	62.6	61.9	82.7	83.6
15	79.2	75.3	169.2	305.0	279.2	750.2	98.7	63.4	58.4	71.6	81.0	82.3
16	80.4	73.5	244.3	347.0	237.3	680.5	89.9	69.6	61.8	102.0	81.1	83.0
17	77.7	75.9	341.5	361.0	233.2	663.5	96.5	83.6	67.2	89.3	79.9	79.4
18	74.6	75.3	269.1	359.1	239.5	776.7	100.9	81.9	65.6	83.3	80.4	63.6
19	78.1	72.9	193.5	356.8	250.7	636.4	97.7	77.1	66.2	71.2	83.2	69.9
20	78.8	76.7	179.0	403.7	409.5	625.6	103.3	83.1	62.9	83.2	80.6	62.1
21	74.8	74.4	193.7	431.0	373.8	613.9	102.4	78.5	60.3	71.5	80.0	58.5
22	72.3	72.1	144.4	507.0	355.4	589.5	95.0	67.9	57.1	83.2	88.9	62.2
23	74.5	73.5	159.2	482.3	348.5	537.3	90.8	61.3	55.6	80.0	86.5	62.4
24	72.0	73.5	145.0	452.0	352.8	470.6	78.0	61.3	83.4	73.9	90.4	62.2
25	71.1	72.0	148.3	437.5	338.8	424.9	83.8	59.7	108.9	74.6	87.8	63.7
26	68.0	71.2	146.0	378.5	322.6	390.6	83.8	58.3	77.0	84.4	73.9	57.9
27	68.5	71.1	148.8	323.7	461.5	330.3	83.1	71.2	74.8	81.7	83.6	59.5
28	74.4	73.4	143.5	305.0	421.6	272.4	89.0	68.6	66.2	74.0	83.7	56.5
29	72.7	79.2	120.5	285.0	393.4	257.9	96.6	68.2	59.8	77.6	79.4	55.6
30	76.5	.....	126.6	297.2	404.1	186.8	96.9	68.0	68.7	77.6	79.7	62.5
31	67.9	.....	122.8	.....	423.2	.....	69.4	67.2	.....	83.5	.....	61.9
1909.												
1	60.8	267.5	177.9	680.1	1,197.1	1,703.0	251.3	104.2	112.0	89.4	97.6	269.4
2	72.0	292.9	174.0	793.1	1,111.5	1,849.5	257.9	108.9	105.3	89.6	97.1	309.9
3	63.8	314.9	177.0	953.0	1,188.7	1,904.8	253.4	98.1	101.0	84.5	95.0	253.8
4	70.8	265.5	215.7	1,059.4	1,559.6	1,920.7	322.0	93.8	92.3	90.1	95.9	213.8
5	91.7	262.2	258.1	816.2	1,954.4	1,939.1	272.1	94.1	110.4	106.6	93.6	203.3
6	533.4	177.2	281.5	765.5	1,777.6	1,738.4	251.4	88.8	94.9	95.2	97.8	216.5
7	463.4	204.5	275.7	699.6	1,336.6	1,707.5	242.7	85.4	112.9	98.7	94.3	209.2
8	285.3	267.3	316.3	621.1	1,869.8	1,611.5	227.8	91.0	96.0	95.4	95.6	196.2
9	283.0	254.3	266.0	630.2	1,969.5	1,283.2	212.1	101.6	102.2	95.3	101.7	197.4
10	217.2	205.0	255.6	706.4	1,782.0	970.0	205.7	110.6	104.2	93.4	125.3	197.8
11	143.6	221.6	250.6	739.9	2,033.0	917.1	186.2	108.3	107.0	95.8	104.1	190.5
12	120.6	191.6	224.1	678.3	1,733.0	782.1	150.2	91.1	101.6	95.8	103.6	171.0
13	147.0	330.4	239.7	677.0	1,513.1	752.3	159.5	91.8	106.4	95.4	99.0	158.7
14	731.1	286.4	258.5	671.4	1,525.0	756.1	152.5	89.6	91.0	95.5	95.4	155.7
15	1,169.7	232.6	262.2	804.8	1,849.8	719.4	147.4	89.6	91.7	101.1	100.1	140.4
16	1,249.9	227.9	307.2	1,038.3	1,969.5	652.7	152.5	91.0	90.5	103.7	99.3	120.8
17	968.8	277.9	381.8	1,291.1	1,690.5	568.0	153.1	93.2	84.9	92.2	92.0	107.1
18	771.1	282.8	571.1	1,601.2	1,364.9	527.3	119.2	91.7	88.2	94.7	95.9	115.7
19	850.0	253.4	433.2	1,643.8	1,531.1	492.2	130.6	95.6	86.2	98.6	90.5	99.9
20	1,000.0	219.1	478.9	1,648.3	1,709.1	493.4	136.2	95.4	87.1	101.8	336.3	99.4
21	1,165.7	226.4	406.4	1,294.0	1,977.3	465.3	129.1	95.2	86.9	95.7	601.6	99.8
22	850.0	197.5	390.2	1,318.5	2,036.4	449.0	118.5	85.7	83.6	95.2	423.8	99.5
23	700.0	206.7	341.0	1,305.8	2,165.6	382.4	122.2	84.7	80.2	101.4	745.9	101.6
24	589.8	165.4	425.7	1,427.4	1,854.4	390.2	124.4	85.9	89.0	93.2	683.4	104.3
25	549.1	174.4	526.9	1,426.8	1,630.6	386.1	117.2	85.2	86.3	93.0	393.1	101.6
26	461.2	176.9	548.1	1,583.9	1,708.8	363.0	121.5	93.5	89.7	98.0	509.8	97.9
27	375.8	179.9	552.2	1,843.0	1,945.5	336.4	129.3	80.8	87.3	93.2	467.5	102.1
28	323.8	174.2	1,285.4	2,252.4	2,215.7	315.1	113.9	81.5	82.9	91.1	329.9	102.6
29	242.5	.....	852.1	2,094.1	1,968.9	300.4	117.0	85.0	100.5	91.6	315.1	99.3
30	198.0	.....	741.4	1,453.8	1,510.9	266.5	117.0	79.5	89.0	102.9	277.1	103.8
31	278.3	.....	767.6	.....	1,457.1	.....	111.5	88.1	.....	98.8	.....	114.6

NOTE.—Determinations of daily discharge, Jan. 19, 20, 22, and 23, omitted from original notes, have been interpolated by engineers of United States Geological Survey, in order to complete the record for the year.

Daily discharge, in second-feet, of Ogden River at dam, for 1910.

[Frank Carr, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	529.3	142.9	224.2	730.8	968.6	.....	.....	.....	56.9	41.0	70.4	66.1
2	799.2	155.4	306.4	785.8	825.2	.....	.....	69.7	50.6	59.4	68.6	63.4
3	559.8	116.3	366.4	948.2	715.4	.....	.....	65.7	52.2	48.7	65.4	69.9
4	413.8	104.6	462.3	879.4	.....	.....	.....	66.5	54.2	51.0	64.3	73.4
5	250.2	104.9	541.4	796.8	.....	.....	.....	64.4	53.0	45.8	69.2	60.6
6	205.6	87.9	569.0	705.7	.....	.....	.....	48.6	53.7	51.1	59.9	64.4
7	189.0	99.5	727.9	750.6	.....	.....	.....	56.1	46.4	53.8	60.0	65.4
8	202.8	103.2	787.0	839.0	.....	.....	.....	54.1	48.1	55.2	61.6	59.2
9	215.0	118.9	810.6	938.1	.....	.....	.....	58.7	50.2	50.4	64.3	80.5
10	176.2	113.9	771.6	1,056.4	.....	.....	.....	57.9	49.5	50.3	62.4	82.0
11	174.0	123.7	741.9	1,293.6	.....	.....	.....	55.0	48.0	57.4	64.5	93.9
12	171.2	112.3	761.6	1,317.0	.....	.....	.....	60.1	46.3	58.5	64.3	79.0
13	179.2	118.4	797.0	1,398.2	.....	.....	.....	57.8	50.8	67.0	66.2	76.0
14	187.5	141.0	878.3	1,323.9	.....	.....	.....	58.3	49.7	58.2	58.3	67.0
15	188.1	118.4	938.9	1,017.6	.....	.....	79.1	55.3	46.9	61.4	68.8	80.9
16	182.6	115.2	1,034.9	970.8	.....	.....	80.7	51.0	53.8	48.2	65.3	68.1
17	182.3	112.8	1,071.3	941.8	.....	.....	68.6	51.7	54.0	51.9	64.1	76.0
18	178.9	116.9	1,178.1	993.8	.....	.....	62.3	52.4	47.8	73.2	65.7	52.6
19	149.5	116.6	1,264.6	900.7	.....	.....	69.7	52.0	48.9	61.7	72.6	64.2
20	151.2	126.0	1,363.9	1,226.0	.....	.....	71.2	58.5	47.9	63.6	63.4	70.9
21	149.9	122.7	1,585.5	1,224.5	.....	.....	69.3	52.8	48.0	65.4	58.3	63.5
22	150.8	115.0	1,811.0	1,141.9	.....	.....	61.0	54.8	50.4	69.0	64.7	70.0
23	150.1	113.5	1,917.8	1,185.3	.....	.....	64.8	54.1	44.5	63.6	75.9	68.0
24	147.2	111.9	1,752.6	1,238.6	.....	.....	59.7	51.0	47.6	58.8	66.0	68.0
25	152.0	123.5	1,203.0	1,238.9	.....	.....	58.2	51.6	47.1	61.8	57.4	67.0
26	156.5	124.9	1,232.1	1,400.8	.....	.....	63.1	56.6	51.5	67.2	68.5	53.1
27	144.5	121.2	1,095.4	1,248.5	.....	.....	68.4	56.7	42.8	66.0	66.9	52.2
28	145.0	150.1	1,032.7	1,243.0	.....	.....	68.3	53.8	53.0	65.7	54.4	59.5
29	149.7	.....	952.4	1,245.1	.....	.....	65.9	45.6	50.3	67.2	64.7	66.8
30	131.6	.....	783.6	922.0	.....	.....	58.2	53.3	49.6	63.9	60.1	67.0
31	138.7	.....	759.8	.....	.....	.....	60.8	53.2	.....	65.8	.....	70.3

NOTE.—Records May 4 to July 14, 1910, not available. Discharge Oct. 27 interpolated.

Monthly discharge of Ogden River near Ogden, Utah, for 1904–1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1904.				
January	61.0	47.1	53.9	3,314
February	602.7	54.4	141.5	8,139
March	691.8	221.5	410.6	25,247
April	1,435.4	490.2	955.5	56,856
May	1,829.9	701.2	1,287.2	79,147
June	616.9	122.7	297.4	17,697
July	129.9	54.1	85.8	5,276
August	74.6	48.5	59.8	3,677
September	59.6	39.3	47.8	2,844
October	71.1	51.3	63.3	3,892
November	67.0	58.8	62.0	3,689
December	89.2	42.7	56.4	3,468
The year	1,829.9	39.3	293.8	213,200
1905.				
January	76.5	41.5	55.7	3,425
February	92.0	57.2	69.7	3,871
March	199.2	78.1	135.6	8,338
April	606.6	153.6	325.2	19,351
May	785.2	367.0	595.1	36,591
June	335.6	81.0	137.3	8,170
July	82.6	52.0	67.5	4,150
August	72.9	44.9	52.3	3,216
September	50.9	42.2	48.0	2,856
October	50.9	42.2	48.1	2,958
November	53.9	47.8	50.4	2,999
December	50.1	39.8	43.2	2,656
The year	785.2	39.8	134.8	98,600

Monthly discharge of Ogden River near Ogden, Utah, for 1904–1910—Continued.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1906.				
January	76.0	44.1	51.4	3,160
February	71.7	48.2	58.2	3,232
March	803.2	69.0	244.9	15,058
April	1,050.8	384.7	680.2	40,480
May	1,349.5	585.5	894.7	55,013
June	1,307.7	170.7	597.3	35,542
July	.....	.....	131.0	8,055
August	.....	.....	91.0	5,595
September	114.3	69.3	85.7	5,100
October	76.9	62.2	69.4	4,267
November	83.7	56.7	73.0	4,344
December	96.7	52.2	76.3	4,692
The year	1,345.9	44.1	254.9	185,000
1907.				
January	93.3	67.8	80.5	4,950
February	3,257.2	105.3	612.3	34,005
March	2,862.8	227.7	786.7	48,371
April	2,835.4	704.4	1,681.7	100,068
May	2,251.3	934.3	1,443.6	88,764
June	1,521.7	299.6	871.3	51,846
July	288.0	97.0	193.3	11,886
August	119.5	76.4	95.3	5,860
September	97.8	80.1	86.7	5,159
October	107.7	69.0	86.3	5,306
November	105.8	78.1	90.4	5,379
December	122.6	66.1	85.9	5,282
The year	3,257.2	66.1	506.8	366,877
1908.				
January	80.0	61.9	72.9	4,482
February	79.2	65.8	73.8	4,245
March	341.5	75.1	136.1	8,368
April	507.0	122.9	281.0	16,721
May	423.2	233.2	338.6	20,820
June	935.4	186.8	605.2	36,012
July	164.2	69.4	104.1	6,401
August	89.8	61.3	74.1	4,556
September	108.9	55.6	66.1	3,933
October	115.5	57.1	77.5	4,765
November	90.4	73.9	82.4	4,903
December	89.5	55.6	72.9	4,482
The year	935.4	55.6	164.9	119,688
1909.				
January	1,249.9	60.8	484.8	29,803
February	330.4	165.4	237.0	13,162
March	1,285.4	174.0	407.4	25,050
April	2,252.4	621.1	1,150.6	68,465
May	2,215.7	1,111.5	1,714.1	105,396
June	1,939.1	266.5	898.1	53,441
July	322.0	111.5	171.1	10,520
August	110.6	79.5	92.2	5,669
September	112.9	80.2	94.7	5,635
October	106.6	84.5	95.7	5,884
November	745.9	92.0	231.9	13,799
December	309.9	97.9	154.6	9,506
The year	2,252.4	60.8	478.3	346,336
1910.				
January	799.2	131.6	222.6	13,687
February	155.4	87.9	119.0	6,609
March	1,917.8	224.2	958.8	58,959
April	1,400.8	705.7	1,063.4	63,270
July (15–31)	80.7	58.2	66.4	2,238
August	69.7	45.6	55.9	3,437
September	56.9	42.8	49.8	2,963
October	73.2	41.0	58.5	3,597
November	75.9	54.4	64.5	3,838
December	93.9	52.2	68.4	4,206
The period	.....	.....	.....	162,804

NOTE.—Monthly means for July and August, 1906, estimated by Utah Light & Ry. Co.

JORDAN RIVER BASIN.

GENERAL FEATURES.[1]

Jordan River drains an area in north-central Utah in the extreme eastern part of the Great Basin. The eastern limit of this area is the lofty Wasatch Range; its western limit is defined by relatively low basin ranges—the Oquirrh, Lake, and East Tintic mountains. It is crossed from east to west by the Traverse Range, whose slopes constitute a dam for Utah Lake, which drains through the Jordan to Great Salt Lake. The area comprises 3,300 square miles, of which 2,600 are tributary to Utah Lake and 700 to the Jordan north of Traverse Mountains. About 2,000 square miles of the area are in the Wasatch Mountains.

Utah Lake is a body of shallow water about 21 miles long and 7 miles wide, covering a maximum area of 93,000 acres, and ranging in depth from less than 8 feet over much of its extent to about 13 feet in the main body of the lake. In its northwestern part, however, soundings have discovered several deep holes caused by springs. The shore line of the lake changes with the varying relations of evaporation, precipitation, and inflow, and the margins are characteristically swampy. Two large, shallow bays extend eastward and southward from the main body of the lake, one south of Provo and the other north of Goshen. West of the lake the Pelican Hills approach close to the shore and the region is barren, but on the north, east, and south the land rises gently toward the base of the mountains and is dotted with flourishing settlements which are supported by irrigation.

The principal streams tributary to Utah Lake are Dry, American Fork, Battle, and Grove creeks, Provo River, Hobble Creek, Spanish Fork and Peteetneet, Santaquin, and Currant creeks.

Provo River is the largest of the tributaries, is approximately 70 miles long and drains an area 640 square miles in extent. It rises in the Uintah Mountains near the sources of Weber, Bear, and Du Chesne rivers, flows westward and southward through Kamas and Provo valleys, and passes through the Wasatch Mountains in the deep canyon. On entering Utah Lake Valley Provo River flows almost due south for 5 miles, skirting the great Provo delta, and thence westward, entering Utah Lake about 3 miles west of Provo.

Hobble Creek rises on the western slope of the Wasatch Mountains and flows in a general southwesterly direction to Utah Lake. The steep, narrow canyon in which the stream flows is broken here and there by narrow openings or flats, covered with a shallow deposit of bowlders and soil. As these tracts lie along the banks of the creek,

[1] Abstracted from Richardson, G. B., Underground water in the valleys of Utah Lake and Jordan River, Utah: Water-Supply Paper U. S. Geol. Survey No. 157, 1906, pp. 5-7.

a large part of the water used in irrigation of the farms is returned to the stream as seepage. The creek has no important tributaries, but short intermittent streams which flow in steep, narrow canyons enter all along the course.

Spanish Fork drains an area about equal to that of Provo River, but carries less water. It rises near Soldier Summit, and, after receiving two main tributaries, North and Thistle Creeks, flows in a canyon through the main ridge of the Wasatch Mountains and enters Utah Lake Valley at the head of the large embayment that extends between Payson and Springville.

Salt Creek rises in the southern Wasatch Mountains, on the eastern slope of Mount Nebo, and, after crossing the border of the plateau region, emerges into the broad valley at the southwestern base of the Wasatch Mountains, where, in summer, it ceases to flow at the surface. The drainage way continues, in a narrow canyon, through Long Ridge, which partially connects the East Tintic and the Wasatch Mountains, and enters the southern end of Utah Lake in Goshen Valley, where the stream, which is fed largely by seepage, is known as Currant Creek.

The other tributaries of Utah Lake are relatively small. The chief ones rise in the Wasatch Mountains and occupy canyons in their mountain courses, where they maintain perennial flows. At the mouths of the canyons canals divert the water and distribute it over the valley, so that in the irrigation season practically all the available supply is thus used and the beds of the streams in Utah Lake Valley are commonly dry; but in the late spring and early summer, during the period of melting snow, large volumes are discharged directly into the lake.

Jordan River itself heads at the northern end of Utah Lake and flows northward in a meandering course of about 40 miles to Great Salt Lake. For the first 5 miles the river flows sluggishly in a broad valley, and in that distance falls only 10 feet. Below the "narrows" the valley spreads out and at its greatest width is about 18 miles wide. The country rises gradually toward the adjacent highlands to the base of the terraces that mark the shore lines of glacial Lake Bonneville, whence the ascent is by successive steps. Between Salt Lake City and Great Salt Lake the country is almost flat, and a number of small lakes of shifting outline occupy local depressions. This area west of Salt Lake City in general is barren and desolate and the surface in many places is white with alkali. On the uplands, away from the lake, alkali is scarce, but the western part of the valley, because of the lack of water, suffers in comparison with the cultivated eastern part, which is supplied by streams from the Wasatch Mountains.

North of the Traverse Mountains the principal tributaries of Jordan River are City, Red Butte, Emigration, Parleys, Mill, Big Cottonwood, Little Cottonwood, Dry Cottonwood, and Willow Creeks, all of which rise on the main crest of the Wasatch and drain small areas. In their mountain courses these creeks generally occupy narrow canyons from which they emerge on the lowlands and flow in broad, open valleys to the Jordan. Within the mountains they are all perennial streams, but at the mouths of the canyons their flow is largely diverted by irrigation ditches, so that in the driest part of the year their lower courses are generally dry. Big Cottonwood Creek, draining about 48 square miles, is the largest. This stream rises at the base of Clayton Peak, is fed by a number of small lakes, and discharges a considerable quantity of water through a narrow canyon.

The vegetation is scanty. The valleys in their natural state are occupied by sagebrush, greasewood, and kindred desert plants, but wherever water is available there is a marked contrast, and the irrigated areas of these valleys rival in productiveness any in the country. Sugar beets are grown in quantity; alfalfa, potatoes, corn, etc., are common crops; and on the bench lands a variety of fruits are successfully cultivated. The mountains on the western border are generally barren; sagebrush and occasional cacti are the chief growths on the slopes, while scrub oak and stunted spruce and pine here and there grow in patches; the summits are usually bare.

The Wasatch Mountains areas are more favored, but they do not support a heavy growth of trees. At the heads of the valleys pine, juniper, mountain mahogany, and quaking aspen grow scatteringly, and cottonwood, birch, and maple are found in many places near the stream beds. The slopes are commonly covered with underbrush in varying degrees of thickness, sagebrush and scrub oak being prominent.

UTAH LAKE TRIBUTARIES.

SUMMIT CREEK NEAR SANTAQUIN, UTAH.

This station, which is located at the power house of the Knight Development Co., near Santaquin, Utah, was established March 8, 1910.

Water is diverted for irrigation and domestic uses below the power house.

The discharge is determined by means of two weirs at the power house. One is a 5-foot, rectangular, sharp-crested weir with complete end contractions, in the main creek above the entrance of the tailrace; the other, a similar weir with a 4-foot crest, in the tailrace, is used during low-water season when the entire flow is taken through the power house. The head on tailrace weir is obtained by means of a standard hook gage installed by the power company. During

1910 the weir in the river above the point of entrance of the tailrace was not used.

A vertical rod gage, fastened to the roots of a cottonwood tree on the left bank about 250 yards above the power house, was used when the flow was greater than the capacity of the weir in the tailrace.

Discharge measurements are made by wading at various sections.

Discharge measurements of Summit Creek near Santaquin, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 8	A. B. Purton	9	7	1.22	13.5
22	do	9	8	1.42	25.2
May 10	do	9	14	1.70	68.0
July 9	do	9	6	1.25	12.2
Sept. 13	do	9	6	1.16	7.6

Daily gage height, in feet, of Summit Creek near Santaquin, Utah, for 1910.

[Lonsdale Allen, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				1.3	1.6	1.6	1.3	0.9	0.8	0.749	0.723	0.679
2				1.3	1.6	1.6	1.3	.9	.8	.993	.723	.679
3				1.3	1.6	1.4	1.3	.9	.8	.766	.722	.679
4				1.3	1.6	1.4	1.3	.9	.8	.736	.721	.679
5				1.4	1.7	1.4	1.3	.9	.8	.745	.721	.679
6				1.4	1.7	1.4	1.3	.9	.8	.752	.721	.679
7				1.4	1.7	1.4	1.3	.9	.8	.714	.721	.679
8				1.4	1.7	1.4	1.3	.9	.8	.708	.721	.679
9			1.2	1.4	1.8	1.4	1.3	.9	.8	.749	.721	.679
10			1.2	1.4	2.0	1.4	1.3	.9	.8	.744	.692	.679
11			1.2	1.5	1.9	1.4	1.3	.9	.8	.742	.692	.679
12			1.2	1.5	1.8	1.4	.9	.9	1.2	.743	.692	.679
13			1.2	1.6	1.9	1.4	.9	.9	1.3	.747	.678	.679
14			1.2	1.6	1.8	1.3	.9	.8	1.2	.748	.678	.652
15			1.2	1.6	1.8	1.3	.9	.8	1.2	.751	.675	.652
16			1.3	1.6	1.7	1.3	.9	.8	1.2	.763	.675	.652
17			1.3	1.6	1.6	1.3	.9	.8	1.2	.932	.675	.652
18			1.3	1.7	1.6	1.3	.9	.8	1.2	.993	.675	.652
19			1.3	1.7	1.6	1.3	.9	.8	1.049	.847	.686	.633
20			1.4	1.7	1.6	1.3	.9	.8	.814	.809	.686	.633
21			1.4	1.7	1.6	1.3	.9	.8	.807	.791	.686	.633
22			1.5	1.7	1.6	1.3	.9	.8	.742	.774	.686	.604
23			1.4	1.7	1.6	1.3	.9	.8	.711	.734	.686	.604
24			1.4	1.8	1.6	1.3	.9	.8	.681	.732	.685	.604
25			1.3	1.8	1.6	1.3	.9	.8	.754	.731	.685	.604
26			1.4	1.9	1.6	1.3	.9	.8	.768	.729	.685	.604
27			1.3	1.8	1.6	1.3	.9	.8	.762	.728	.685	.534
28			1.3	1.7	1.6	1.3	.9	.8	.751	.726	.679	.534
29			1.3	1.7	1.6	1.3	.9	.8	.749	.725	.679	.534
30			1.3	1.7	1.6	1.3	.9	.8	.723	.723	.679	.585
31			1.3	.....	1.6	.....	.9	.8	.....	.723	.....	.591

NOTE.—Gage heights Mar. 8 to July 11 and Sept. 12 to 18 read on staff gage above the power house; from July 12 to Sept. 11 and Sept. 19 to Dec. 31 the head on the weir in the tailrace was read.

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Daily discharge, in second-feet, of Summit Creek near Santaquin, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				17	48	48	16	11	9.5	8.7	8.3	7.5
2				17	48	48	16	11	9.5	13	8.3	7.5
3				17	48	24	16	11	9.5	8.9	8.3	7.5
4				17	48	24	16	11	9.5	8.4	8.3	7.5
5				24	68	24	16	11	9.5	8.6	8.3	7.5
6				24	68	24	16	11	9.5	8.7	8.3	7.5
7				24	68	24	16	11	9.5	8.0	8.3	7.5
8				24	68	24	16	11	9.5	7.9	8.3	7.5
9			12	24	92	24	16	11	9.5	8.7	8.3	7.5
10			12	24	154	24	16	11	9.5	8.6	7.7	7.5
11			12	34	121	24	16	11	9.5	8.5	7.7	7.5
12			12	34	92	24	11	11	10	8.5	7.7	7.5
13			12	48	121	24	11	11	16	8.6	7.6	7.5
14			12	48	92	16	11	9.5	10	8.6	7.6	7.1
15			12	48	92	16	11	9.5	10	8.7	7.5	7.1
16			17	48	68	16	11	9.5	10	8.9	7.5	7.1
17			17	48	48	16	11	9.5	10	12	7.5	7.1
18			17	68	48	16	11	9.5	10	13	7.5	7.1
19			17	68	48	16	11	9.5	14	10.4	7.6	6.7
20			24	68	48	16	11	9.5	9.7	9.7	7.6	6.7
21			24	68	48	16	11	9.5	9.7	9.4	7.6	6.7
22			34	68	48	16	11	9.5	8.5	9.1	7.6	6.3
23			24	68	48	16	11	9.5	8.0	8.4	7.6	6.3
24			24	92	48	16	11	9.5	7.5	8.4	7.6	6.3
25			17	92	48	16	11	9.5	8.7	8.3	7.6	6.3
26			24	121	48	16	11	9.5	9.0	8.3	7.6	6.3
27			17	92	48	16	11	9.5	8.9	8.3	7.6	5.2
28			17	68	48	16	11	9.5	8.7	8.3	7.5	5.2
29			17	68	48	16	11	9.5	8.7	8.3	7.5	5.2
30			17	68	48	16	11	9.5	8.3	8.3	7.5	6.0
31			17		48		11	9.5		8.3		6.1

NOTE.—Daily discharge Mar. 8 to July 11 and Sept. 12 to 18 determined from two discharge rating curves well defined. Daily discharge July 12 to Sept. 11 and Sept. 19 to Dec. 31 computed from readings of head on the weir in tailrace and the use of weir formula, $Q=3.33\ LH^{3/2}$. This formula gives values a few per cent higher than one which allows for end contractions. This is considered justifiable, however, owing to probable high velocity of approach in the tailrace.

Monthly discharge of Summit Creek near Santaquin, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
Mar. 9 to 31			17.7	805
April	121	17	51.0	3,030
May	154	48	65.0	4,000
June	48	16	21.1	1,260
July	16	11	12.8	787
August	11	9.5	10.1	621
September	16	8.0	9.67	575
October	13	8.3	9.03	555
November	8.3	7.5	7.80	464
December	7.5	5.2	6.85	421
The period				12,500

PETEETNEET CREEK[1] NEAR PAYSON, UTAH.

Peteetneet Creek rises to the south of Spanish Fork, at an elevation of about 7,000 feet above sea level, and flows northwestward to Utah Lake.

[1] Called Payson Creek in Water-Supply Paper U. S. Geol. Survey No. 270.

The gaging station, which is located in the SE. ¼ SW. ¼ sec. 29, T. 9 S., R. 2 E., Salt Lake base and meridian, about 3 miles from Payson and half a mile above the power-canal intake, was established August 1, 1910, replacing a station established at the power plant April 8, 1908, and abandoned because the weirs used were poorly constructed and the records were very unsatisfactory. No estimates of daily discharge can be made for 1908–9.

Above the station the city of Payson has constructed several reservoirs which impound a considerable amount of the spring run-off and maintain a summer flow for power and irrigation. The records derived from observations at this point indicate the amount of water available for the Payson power house and for the water supply of the Strawberry Valley project from this creek.

The gage is an inclined rod spiked to posts driven in the left bank.

At ordinary stages discharge measurements can be made by wading; flood-stage measurements are made from a foot bridge constructed for the purpose.

Discharge measurements of Peteetneet Creek near Payson, Utah, in 1910.

Date.	Hydrographers.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 5	A. F. Richards	8.6	4.6	1.55	9.7
5	A. B. Purton	8.6	4.4	1.55	9.2
24	Larson and Richards	3.5	3.5	1.60	10.0

NOTE.—See also miscellaneous measurements, page 251.

Daily gage height, in feet, and discharge, in second-feet, for Peteetneet Creek near Payson, Utah, for 1910.

[Edwin Cushing, observer.]

Day.	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	1.60	10.0	.....	10.0	.....	10.5	1.56	9.6	1.57	9.7
2	.....	10.6	1.61	10.1	1.68	11.0	.....	9.6	.....	9.8
3	1.70	11.3	.....	10.1	.....	10.5	1.56	9.6	1.58	9.8
4	.....	11.0	1.61	10.1	1.60	10.0	.....	9.6	.....	9.8
5	1.65	10.6	.....	10.1	.....	10.0	1.57	9.7	1.59	9.9
6	.....	10.3	1.61	10.1	1.60	10.0	.....	9.8	.....	9.8
7	1.60	10.0	.....	10.0	.....	9.9	1.59	9.9	1.57	9.7
8	.....	10.3	1.60	10.0	1.58	9.8	.....	9.8	.....	9.6
9	1.65	10.6	.....	10.0	.....	9.7	1.57	9.7	1.56	9.6
10	.....	10.3	1.59	9.9	1.56	9.6	.....	9.8	.....	9.6
11	1.60	10.0	.....	10.0	.....	9.6	1.58	9.8	1.56	9.6
12	.....	10.0	1.60	10.0	1.56	9.6	.....	9.8	.....	9.8
13	1.60	10.0	.....	10.0	.....	9.6	1.57	9.7	1.60	10.0
14	.....	10.3	1.60	10.0	1.57	9.7	.....	9.6	.....	9.9
15	1.65	10.6	.....	10.0	1.57	9.7	1.56	9.6	1.58	9.8
16	.....	10.4	1.60	10.0	.....	9.9	.....	9.7	.....	9.8
17	1.61	10.1	.....	10.0	.....	10.1	1.58	9.8	1.57	9.7
18	.....	10.2	1.61	10.1	1.62	10.3	.....	10.4	.....	9.7
19	1.62	10.3	.....	10.0	.....	10.0	1.67	10.9	1.57	9.7
20	.....	10.2	1.60	10.0	1.58	9.8	.....	10.4	.....	9.8

Daily gage height, in feet, and discharge, in second-feet, for Peteetneet Creek near Payson, Utah, for 1910—Continued.

Day.	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
21	1.61	10.1	.....	10.0	.....	9.8	1.59	9.9	1.58	9.8
22	.....	10.2	1.59	9.9	1.57	9.7	.....	9.8	.....	9.7
23	1.62	10.3	.....	9.8	.....	9.6	1.58	9.8	1.56	9.6
24	.....	10.2	1.58	9.8	1.56	9.6	.....	9.8	.....	9.2
25	1.61	10.1	.....	9.8	.....	9.6	1.58	9.8	1.50	8.9
26	.....	10.0	1.59	9.9	1.55	9.5	.....	9.9	.....	9.0
27	1.60	10.0	.....	10.0	.....	9.5	1.60	10.0	1.51	9.0
28	.....	10.2	1.60	10.0	1.55	9.5	.....	9.9	.....	9.1
29	1.62	10.3	.....	10.0	.....	9.5	1.58	9.8	1.52	9.2
30	.....	10.2	1.59	9.9	1.55	9.5	.....	9.8	.....	9.3
31	1.60	10.0	.....	.....	.....	9.6	.....	.....	1.54	9.4

NOTE.—Range of stage very small. Daily discharge determined from a fairly well-defined discharge-rating curve based on three measurements. Discharge interpolated for days on which gage was not read.

Monthly discharge of Peteetneet Creek near Payson, Utah, for 1910.

[Drainage area, 28 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
August	11.3	10.0	10.3	0.368	0.42	633	A.
September	10.1	9.8	9.99	.357	.40	595	A.
October	11.0	9.5	9.83	.351	.40	604	A.
November	10.9	9.6	9.84	.351	.39	586	A.
December	10.0	8.9	9.59	.342	.39	590	A.
The period	.....	.....	.....	.....	.....	.....	

SPANISH FORK AT THISTLE, UTAH.

This station, which is located about half a mile below Thistle, a station on the Denver & Rio Grande Railroad, was established December 3, 1907, to determine the amount of water available for irrigation and power development in connection with the Strawberry Valley project of the United States Reclamation Service.

Thistle Creek and Soldier Fork unite above the station to form Spanish Fork, and Diamond Fork comes in about 2 miles below. Diversion ditches above the station are unimportant.

The gage is a vertical staff; its datum has remained unchanged since the station was established.

Discharge measurements are made from a car and cable.

The river usually freezes over at the station during two or three months in the winter, but as the winter flow is fairly constant good estimates may be made. The accuracy of the records is not affected by artificial control.

The section shifts badly at high stages, but many measurements have been made and the results may be considered fairly good.

Discharge measurements of Spanish Fork at Thistle, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 2	A. B. Purton	34	37	2.80	93
21	do	37	64	3.55	254
Apr. 29	do	39	93	4.05	464
June 21	do	34	36	2.90	82
July 23	do	33	31	2.78	64.4
Aug. 9	do	29	28	2.59	43.3
Sept. 19	do	29	32	2.70	59

Daily gage height, in feet, of Spanish Fork at Thistle, Utah, for 1910.

[E. T. Cluff, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			2.8	3.35	4.0	3.4	2.8	2.8		2.6		2.7
2			2.8	3.35	3.9	3.4	2.8	2.8	2.5		2.7	
3			2.8		3.9	3.4		2.75		2.5		2.7
4			2.8	3.35	3.8	3.4		2.75	2.5		2.7	
5			2.85	3.35	3.8		2.8	2.7		2.5	2.7	2.7
6			2.9	3.35	3.7	3.3	2.8	2.7	2.5			
7			2.95	3.35	3.7	3.25	2.8	2.7		2.5	2.7	2.7
8			3.0	3.4	3.7	3.2	2.8	2.7	2.5	2.5		
9			3.1	3.4	3.8	3.2	2.8	2.7			2.7	2.7
10			3.2		3.9	3.15		2.7	2.5			2.7
11			3.15	3.6	3.9	3.1	2.8	2.7		2.5	2.7	
12			3.1	3.7	3.95	3.05	2.8	2.7	2.5		2.7	2.7
13			3.1	3.7	3.9	3.0	2.8	2.7		2.5		
14			3.2	3.6	3.8	2.95	2.8	2.7	2.5	2.6	2.7	2.7
15			3.3	3.6		2.9	2.8	2.7				
16			3.4	3.6	3.8	2.9	2.8	2.6	2.5	2.75	2.7	2.7
17			3.5		3.7	2.9	2.8	2.6	2.6			2.7
18			3.4	3.7	3.7	2.9	2.8	2.6	2.7	2.8	2.7	
19			3.5	3.7	3.6	2.9	2.8	2.6	2.7		2.7	2.7
20				3.7	3.6	2.9	2.8	2.6				
21			3.6	3.9	3.6	2.9	2 8		2.6	2.65	2.7	2.7
22			3.7	3.9		2.9	2.8	2.6				
23			3.75	3.9	3.5	2.9	2.8	2.6	2.6	2.7	2.7	2.7
24			3.55		3.45	2.85	2.8	2.6	2.55			2.7
25			3.45	3.8	3.4	2.8	2.7	2.6		2.65	2.7	
26			3.45	4.0	3.4	2.8	2.8	2.6	2.6	2.7	2.7	2.7
27				4.1	3.4	2.8	2.8	2.6	2.55			
28			3.35	4.1	3.45	2.9	2.8		2.5	2.7	2.7	2.65
29			3.35	4.1	3.45	2.95	2.85	2.5		2.7		
30			3.35	4.0	3.45	2.95	2.85		2.6		2.7	2.65
31			3.35		3.4			2.5		2.7		2.65

NOTE.—Gage not read during January or February, as the stream was probably frozen over. Relation between gage heights and discharge probably unaffected by ice during March and December.

Daily discharge, in second-feet, of Spanish Fork at Thistle, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			92	206	440	1.95	69	69	34	44	56	56
2			92	206	400	1.95	69	69	34	39	56	56
3			92	206	395	1.95	69	62	34	34	56	56
4			92	206	360	1.95	69	62	34	34	56	56
5			101	206	355	1.80	69	56	34	34	56	56
6			110	206	325	170	69	56	34	34	56	56
7			120	206	320	160	69	56	34	34	56	56
8			130	218	320	145	69	56	34	34	56	56
9			150	218	345	145	69	56	34	34	56	56
10			172	243	375	155	69	56	34	34	56	56
11			161	268	365	125	69	56	34	34	56	56
12			150	294	370	110	69	56	34	34	56	56
13			150	294	350	100	69	56	34	34	56	56
14			172	268	320	90	69	56	34	44	56	56
15			194	268	320	83	69	56	34	53	56	56
16			218	268	320	83	69	44	34	62	56	56
17			242	284	290	83	69	44	44	66	56	56
18			218	300	290	83	69	44	56	69	56	56
19			242	305	260	83	69	44	56	62	56	56
20			255	310	260	83	69	44	50	56	56	56
21			268	380	260	83	69	44	44	50	56	56
22			294	385	240	83	69	44	44	53	56	56
23			307	390	225	83	69	44	44	56	56	56
24			255	375	215	76	69	44	39	53	56	56
25			230	365	205	69	56	44	39	50	56	56
26			230	435	205	69	69	44	44	56	56	56
27			218	480	205	69	69	44	39	56	56	53
28			206	480	210	83	69	39	34	56	56	50
29			206	485	210	90	76	34	39	56	56	50
30			206	445	210	90	76	34	44	56	56	50
31			206		200		72	34		56		50

NOTE.—Daily discharge determined as follows: Mar. 1 to Apr. 16, and June 14 to Dec. 31, from two well-defined discharge rating curves; Apr. 17 to June 13, indirect method for shifting channels used.

Monthly discharge of Spanish Fork at Thistle, Utah, for 1910.

[Drainage area, 480 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			95	0.198	0.23	5,840	C.
February			90	.188	.20	5,000	C.
March	307	92	186	.388	.45	11,400	A.
April	485	206	307	.640	.71	18,300	B.
May	440	200	296	.617	.71	18,200	C.
June	195	69	114	.238	.27	6,780	B.
July	76	56	69.1	.144	.17	4,250	A.
August	69	34	49.9	.104	.12	3,070	A.
September	56	34	38.7	.081	.09	2,300	A.
October	69	34	47.3	.099	.11	2,910	A.
November	56	56	56.0	.117	.13	3,330	A.
December	56	50	55.1	.115	.13	3,390	B.
The year	485	34	117	.244	3.32	84,800	

NOTE.—Discharge for January and February estimated from flow of river at mouth of canyon and the run-off of the drainage area of Diamond Fork near Thistle, allowing a small gain below the mouth of Diamond Fork.

SPANISH FORK NEAR SPANISH FORK, UTAH.

This station, which is located in the mouth of the canyon, about 600 feet above the diversion dam of the East Bench Irrigation Co. and about 5 miles southeast of Spanish Fork, Utah, was established May 23, 1900, discontinued November 30, 1901, and reestablished March 26, 1903, to determine the total water available from Spanish Fork for irrigation near Utah Lake.

The station is below all tributaries and above all important ditches except the Reclamation Service power canal, which diverts water at a point about a mile above the station. The water thus diverted is used to develop power, after which a part of the water is returned to the river, the remainder being turned into the Salem canal and used for irrigation. The entire low-water flow of the river below the station is used for irrigation. The amount of water diverted is measured and added to the estimated discharge of the river.

The datum of the staff gage has remained unchanged since the station was originally established.

Measurements are made from a cable and car during high stages and by wading at low stages.

The relation between gage height and discharge is little affected by ice and not at all by artificial control below. Variations in daily gage heights are caused by manipulation of gates on the Reclamation Service diversion dam above.

Although the section is somewhat shifting, numerous measurements have been made, and the results obtained are good.

Discharge measurements of Spanish Fork near Spanish Fork, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 3	A. B. Purton	33	25	−0.1	55
23	do	38	82	1.58	414
June 11	do	37	39	0.35	122
21	do	35	60	0.15	101
Aug. 11	do	16	12	−.24	24.6
Sept. 2	do	14	9	−.38	13.5
20	do	19	16	−.10	39.1

Daily gage height, in feet, of Spanish Fork near Spanish Fork, Utah, for 1910.

[Geo. H. Lewis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	−0.20	−0.20	−0.20	0.70	2.40	0.60	0.08	−0.18	−0.36	−0.34	−0.30	−0.46
2	−.20	−.20	−.20	.70	2.10	.59	.00	−.22	−.34	−.06	−.32	−.46
3	−.20	−.30	.00	.70	2.00	.58	.00	−.20	−.30	−.10	−.32	−.44
4	−.20	−.30	.10	.70	1.90	.54	.00	−.20	−.31	−.16	−.34	−.44
5	−.20	−.25	.10	.70	1.90	.51	.00	−.20	−.33	−.16	−.36	−.48
6	−.20	−.25	.10	.80	1.85	.46	.00	−.20	−.37	−.16	−.38	−.49
7	−.20	−.25	.20	.80	1.80	.44	.00	−.20	−.36	−.19	−.40	−.49
8	−.20	−.20	.40	.90	1.80	.39	−.01	−.21	−.36	−.22	−.40	−.49
9	−.20	−.20	.50	1.05	1.90	.38	−.02	−.25	−.40	−.22	−.42	−.48
10	−.20	−.20	.40	1.20	2.00	.37	−.04	−.25	−.40	−.24	−.41	−.45
11	−.20	−.20	.60	1.40	2.00	.35	−.06	−.28	−.41	−.30	−.39	−.42
12	−.20	−.20	.70	1.55	2.00	.34	−.07	−.28	−.40	−.30	−.35	−.41
13	−.25	−.20	.65	1.60	2.00	.33	−.08	−.32	−.35	−.30	−.37	−.50
14	−.20	−.20	.95	1.45	1.80	.28	−.08	−.34	−.30	−.29	−.36	−.49
15	−.20	−.20	.95	1.30	1.70	.24	−.07	−.34	−.22	−.27	−.36	−.50
16	−.20	−.30	1.00	1.30	1.60	.22	−.03	−.31	−.20	−.18	−.40	−.50
17	−.20	−.30	.90	1.30	1.50	.21	−.03	−.30	−.20	−.18	−.35	−.49
18	−.25	−.25	.90	1.30	1.40	.20	−.04	−.32	−.14	−.16	−.40	−.50
19	−.25	−.25	1.00	1.70	1.35	.20	−.08	−.31	−.06	−.16	−.25	−.50
20	−.25	−.25	1.20	1.90	1.25	.17	−.09	−.28	−.11	−.20	−.30	−.49
21	−.20	−.25	1.40	2.00	1.20	.14	−.10	−.32	−.18	−.24	−.36	−.45
22	−.20	−.20	1.55	2.00	1.10	.12	−.10	−.32	−.22	−.24	−.32	−.50
23	−.20	−.20	1.70	2.05	1.00	.10	−.10	−.34	−.22	−.24	−.28	−.50
24	−.20	−.25	1.10	2.10	.85	.10	−.11	−.34	−.22	−.26	−.34	−.50
25	−.20	−.20	1.00	2.35	.85	.10	−.12	−.34	−.28	−.26	−.36	−.50
26	−.20	−.20	.90	2.50	.85	.07	−.12	−.33	−.23	−.26	Dry.	−.50
27	−.20	−.20	1.00	2.60	.80	.04	−.13	−.33	−.28	−.25	−.45	−.50
28	−.25	−.20	.80	2.60	.80	.01	−.14	−.31	−.24	−.27	−.48	−.50
29	−.20	.....	.80	2.60	.70	.10	−.16	−.30	−.29	−.26	−.44	−.50
30	−.30	.....	.70	2.50	.65	.15	−.18	−.34	−.32	−.28	−.43	−.50
31	−.25	.....	.70	.....	.65	.....	−.20	−.33	.....	−.30	.....	−.50

Daily discharge, in second-feet, of Spanish Fork near Spanish Fork, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	47	47	47	197	647	176	76	31	15	16	19	8.4
2	47	47	47	197	557	174	64	28	16	44	18	8.4
3	47	37	72	197	528	172	64	29	19	39	18	9.6
4	47	37	86	197	499	165	63	29	18	32	16	9.6
5	47	42	86	197	499	159	63	28	17	32	15	7.2
6	47	42	86	218	485	149	62	28	14	32	13	6.6
7	47	42	102	218	471	146	62	27	15	29	12	6.6
8	47	47	138	240	471	136	60	26	15	26	12	6.6
9	47	47	157	274	499	134	58	23	12	26	11	7.2
10	47	47	138	310	528	133	54	23	12	24	11	9.0
11	47	47	176	361	528	129	51	21	11	19	13	11
12	47	47	197	402	528	127	50	21	12	19	16	11
13	42	47	186	415	528	125	49	18	16	19	14	6.0
14	47	47	252	374	471	116	48	16	19	20	15	6.6
15	47	47	252	335	443	109	48	16	26	22	15	6.0
16	47	37	263	335	415	106	52	18	28	30	12	6.0
17	47	37	240	335	388	104	52	19	28	30	16	6.6
18	42	42	240	335	361	102	50	18	35	32	12	6.0
19	42	42	263	443	348	102	46	18	44	32	24	6.0
20	42	42	310	499	322	97	44	21	38	28	19	6.6
21	47	42	361	528	310	92	43	18	30	24	15	9.0
22	47	47	402	528	286	89	42	18	26	24	18	6.0
23	47	47	443	542	263	84	42	16	26	24	21	6.0
24	47	42	286	557	229	84	40	16	26	23	16	6.0
25	47	47	263	632	229	83	39	16	21	23	15	6.0
26	47	47	240	677	229	78	38	17	25	23	0	6.0
27	47	47	263	708	218	73	37	17	21	24	9.0	6.0
28	42	47	218	708	218	68	36	18	24	22	7.2	6.0
29	47	.....	218	708	197	82	34	19	20	23	9.6	6.0
30	37	.....	197	677	186	88	32	16	18	21	10	6.0
31	42	.....	197	.....	186	.....	30	17	.....	19	.....	6.0

NOTE.—Daily discharges determined as follows: Jan. 1 to June 21, from a discharge rating curve that is fairly well defined; June 22 to Aug. 10, by indirect method for shifting channels; Aug. 11 to Dec. 31, from a well-defined curve.

Monthly discharge of Spanish Fork near Spanish Fork, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	47	37	45.7	2,810	B.
February	47	37	44.1	2,450	B.
March	443	47	207	12,700	B.
April	708	197	411	24,500	A.
May	647	186	389	23,900	A.
June	176	68	116	6,900	B.
July	76	30	49.3	3,030	B.
August	31	16	20.8	1,280	B.
September	44	11	21.6	1,290	A.
October	44	16	25.8	1,590	A.
November	24	0	14.1	839	B.
December	11	6	7.1	437	B.
The year	708	0	113	81,700	

Combined monthly discharge of Spanish Fork and power canal near Spanish Fork, Utah, for 1910.

[Drainage area, 670 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	162	130	151	0.225	0.26	9,280	B.
February	162	109	147	.219	.23	8,160	B.
March	554	162	318	.475	.55	19,600	B.
April	777	300	502	.749	.84	29,900	A.
May	707	249	456	.681	.79	28,000	A.
June	245	142	183	.273	.30	10,900	B.
July	155	112	131	.196	.23	8,060	B.
August	122	78	89.8	.134	.15	5,520	B.
September	118	79.2	91.5	.137	.15	5,440	A.
October	131	86.1	95.2	.142	.16	5,850	A.
November	103	86.4	94.9	.142	.16	5,650	B.
December	103	71	88.7	.132	.15	5,450	B.
The year	777	71	196	.293	3.97	142,000	

UNITED STATES RECLAMATION SERVICE POWER CANAL NEAR SPANISH FORK, UTAH.

This station, which is located in the mouth of the canyon at a point about half a mile below the canal head gates and about 5 miles southeast of Spanish Fork, Utah, was established January 1, 1909, to determine the amount of water diverted by the Reclamation Service for power in connection with the Strawberry Valley project.

The station is located in the middle of a long tangent on the canal, which is smoothly lined with concrete. A good rating curve has been obtained and the records may be considered excellent. The gage datum has remained unchanged since the station was established.

The discharge of this canal has been added to that of the river at the station near Spanish Fork, just below, to give the total discharge of Spanish Fork above the diversions.

The following discharge measurement was made by A. B. Purton:

March 3, 1910: Width, 10 feet; area, 20 square feet; gage height, 2.85 feet; discharge, 109 second-feet.

Daily gage height, in feet, of United States Reclamation Service power canal near Spanish Fork, Utah, for 1910.

[George H. Lewis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.8	2.6	2.9	2.8	2.1	2.25	2.40	2.48	2.26	2.39	2.32	2.51
2	2.9	2.8	2.9	2.8	2.05	2.2	2.31	2.62	2.18	2.52	2.34	2.50
3	2.9	2.7	2.9	2.9	2.05	2.2	2.38	2.29	2.15	2.05	2.36	2.54
4	2.9	2.55	2.95	2.75	2.0	2.15	2.40	2.28	2.26	2.05	2.39	2.58
5	2.85	2.65	2.9	2.75	2.1	2.14	2.50	2.25	2.26	2.02	2.36	2.38
6	2.65	2.65	2.9	2.9	2.1	2.19	2.50	2.24	2.31	2.05	2.42	2.38
7	2.9	2.65	3.0	2.8	2.2	2.16	2.46	2.2	2.23	2.08	2.48	2.50
8	2.8	2.8	2.95	2.8	2.2	2.22	2.49	2.24	2.21	2.10	2.52	2.48
9	2.9	2.75	3.05	2.8	2.2	2.22	2.49	2.21	2.26	2.12	2.46	2.50
10	2.85	2.75	3.1	2.85	2.1	2.20	2.49	2.25	2.22	2.15	2.46	2.55
11	2.85	2.75	1.28	2.8	2.1	2.18	2.44	2.23	2.30	2.25	2.48	2.56
12	2.9	2.75	1.4	2.8	2.05	2.20	2.44	2.30	2.22	2.25	2.40	2.59
13	2.8	2.75	2.65	2.75	2.1	2.20	2.44	2.34	2.21	2.28	2.42	2.54
14	2.8	2.75	2.7	3.0	2.2	2.20	2.42	2.25	2.24	2.28	2.46	2.53
15	2.8	2.7	2.7	2.85	2.25	2.16	2.48	2.26	2.29	2.26	2.42	2.46
16	2.8	2.7	2.75	2.9	2.3	2.16	2.46	2.21	2.32	2.34	2.4	2.45
17	2.8	2.3	2.75	2.9	2.2	2.15	2.39	2.18	2.38	2.34	2.4	2.45
18	2.75	2.8	2.8	2.45	2.3	2.15	2.51	2.2	2.31	2.44	2.35	2.40
19	2.6	2.75	2.9	2.1	2.25	2.19	2.50	2.1	2.32	2.34	2.4	2.42
20	2.7	2.75	2.8	2.25	2.2	2.19	2.46	2.2	2.26	2.31	2.38	2.46
21	2.75	2.8	2.85	2.25	2.25	2.21	2.45	2.22	2.22	2.25	2.39	2.52
22	2.75	2.85	3.0	2.15	2.3	2.18	2.46	2.22	2.22	2.24	2.46	2.39
23	2.85	2.8	2.85	2.15	2.35	2.22	2.41	2.21	2.19	2.28	2.52	2.24
24	2.75	2.85	2.9	2.15	2.3	2.22	2.38	2.19	2.21	2.26	2.49	2.38
25	2.7	2.85	2.9	2.15	2.3	2.16	2.38	2.21	2.29	2.26	2.48	2.42
26	2.75	2.9	3.0	2.15	2.4	2.30	2.42	2.20	2.19	2.26	2.65	2.32
27	2.7	2.85	2.85	2.05	2.4	2.24	2.44	2.20	2.31	2.29	2.38	2.18
28	2.6	2.9	2.95	2.25	2.4	2.32	2.45	2.20	2.26	2.30	2.42	2.44
29	2.85	.....	2.8	2.0	2.3	2.4	2.41	2.20	2.37	2.33	2.48	2.28
30	2.6	.....	2.65	2.25	2.15	2.36	2.42	2.22	2.4	2.32	2.45	2.35
31	2.6	.....	2.75	.....	2.15	.....	2.45	2.21	.....	2.35	.....	2.38

Daily discharge, in second-feet, of United States Reclamation Service power canal near Spanish Fork, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	107	92.5	115	107	60.1	69.1	78.7	84.1	69.7	78.0	73.5	86.2
2	115	107	115	107	57.3	66	72.8	93.9	64.8	86.9	74.8	85.5
3	115	99.7	115	115	57.3	66	77.4	71.6	63.0	57.3	76.1	88.3
4	115	89	119	103	54.5	63	78.7	71.0	69.7	57.3	78.0	91.1
5	111	96.1	115	103	60.1	62.5	85.5	69.1	69.7	55.6	76.1	77.4
6	96.1	96.1	115	115	60.1	65.4	85.5	68.5	72.8	57.3	80.1	77.4
7	115	96.1	123	107	66.0	63.6	82.8	66.0	69.7	59.0	84.1	85.5
8	107	107	119	107	66.0	67.2	84.8	68.5	66.6	60.1	86.9	84.1
9	115	103	127	107	66.0	67.2	84.8	66.6	69.7	61.3	82.8	85.5
10	111	103	131	111	60.1	66	84.8	69.1	67.2	63.0	82.8	89.0
11	111	103	107	107	60.1	64.8	81.4	67.9	72.2	69.1	84.1	89.7
12	115	103	78.7	107	57.3	66	81.4	72.2	67.2	69.1	78.7	91.8
13	107	103	96.1	111	60.1	66	81.4	74.8	66.6	71.0	80.1	88.3
14	107	103	99.7	123	66.0	66	80.1	69.1	68.5	71.0	82.8	87.6
15	107	99.7	99.7	111	69.1	63.6	84.1	69.7	71.6	69.7	80.1	82.8
16	107	99.7	103	115	72.2	63.6	82.8	66.6	73.5	74.8	78.7	82.1
17	107	72.2	103	115	66.0	63	78.0	64.8	77.4	74.8	78.7	82.1
18	103	107	107	82.1	72.2	63	86.2	66.0	72.8	81.4	75.4	78.7
19	92.5	103	115	60.1	69.1	65.4	85.5	60.1	73.5	74.8	78.7	80.1
20	99.7	103	107	69.1	66.0	65.4	82.8	66.0	69.7	72.8	77.4	82.8
21	103	107	111	69.1	69.1	66.6	82.1	67.2	67.2	69.1	78.0	86.9
22	103	111	123	63	72.2	64.8	82.8	67.2	67.2	68.5	82.8	78.0
23	111	107	111	63	75.4	67.2	79.4	66.6	65.4	71.0	86.9	68.5
24	103	111	115	63	72.2	67.2	77.4	65.4	66.6	69.7	84.8	77.4
25	99.7	111	115	63	72.2	63.6	77.4	66.6	71.6	69.7	84.1	80.1
26	103	115	123	63	78.7	72.2	80.1	66.0	65.4	69.7	96.1	73.5
27	99.7	111	111	57.3	78.7	68.5	81.4	66.0	72.8	71.6	77.4	64.8
28	92.5	115	119	69.1	78.7	73.5	82.1	66.0	69.7	72.2	80.1	81.4
29	111	.....	107	54.5	72.2	78.7	79.4	66.0	76.8	74.2	84.1	71.0
30	92.5	.....	96.1	69.1	63.0	76.1	80.1	67.2	78.7	73.5	82.1	75.4
31	92.5	.....	103	.....	63.0	.....	82.1	66.6	.....	75.4	.....	77.4

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of United States Reclamation Service power canal near Spanish Fork, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy
	Maximum.	Minimum.	Mean.		
January	115	92.5	106	6,520	A.
February	115	72.2	103	5,720	A.
March	131	78.7	111	6,820	A.
April	123	54.5	90.5	5,390	A.
May	78.7	54.5	66.5	4,090	A.
June	78.7	62.5	66.7	3,970	A.
July	86.2	72.8	81.4	5,000	A.
August	93.9	60.1	68.9	4,240	A.
September	78.7	63.0	69.9	4,160	A.
October	86.9	55.6	69.3	4,260	A.
November	96.1	73.5	80.9	4,810	A.
December	91.8	64.8	81.6	5,020	A.
The year	131	54.5	83.8	60,000	

SPANISH FORK NEAR LAKE SHORE, UTAH.

This station, which is located about 3 miles west of Spanish Fork, Utah, 1 mile east of Lake Shore, and about 3 miles above the mouth of the river, was established December 10, 1903, discontinued July 10, 1907, and reestablished March 10, 1909, to determine the amount of water wasted into Utah Lake.

The station is below all tributaries and diversion ditches. The original location was about 800 feet above the wagon bridge on the road from Spanish Fork to Lake Shore, but as the section was very unsatisfactory the station was relocated at a point about one-half mile farther downstream, where conditions for measuring are excellent.

The gage is a staff; its datum has remained unchanged since the station was reestablished.

Discharge measurements are made from a cable and car.

The relation between gage height and discharge is not affected by ice or artificial control below. The bed of the stream is probably permanent at the station. A good rating curve has been obtained and the records for 1910 may be considered excellent.

Discharge measurements of Spanish Fork near Lake Shore, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 1	O. W. Hartwell	24	63	4.63	133
Mar. 4	A. B. Purton	28	89	5.11	206
July 26[a]	do	5.4	2	1.21	1.45
Sept. 1[a]	do	5.8	2	1.20	1.18

[a] Measurement on July 26 and Sept. 1 made by wading.

Daily gage height, in feet, of Spanish Fork near Lake Shore, Utah, for 1910.

[G. J. Hansen, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				6.35	7.4	1.30	1.25	1.21				
2		3.75	4.20	6.70	6.95				1.20		2.25	3.15
3	3.75		4.60	6.80	6.0	1.25		1.21		1.37		
4		3.70	5.10	7.0	5.65		1.25				2.25	
5	3.80		5.25	7.0	5.55			1.25	1.20	1.3		3.2
6			5.30	7.1	5.10	1.25	1.25					
7	3.85	3.70	5.75	7.0	4.8				1.20	1.3	2.9	3.1
8			6.50	7.15	4.8	1.25	1.20	1.21				
9		3.40	6.70	7.60	4.2				1.25		3.05	3.2
10	3.75		6.40	8.05	3.85	1.25		1.21		1.3		
11		3.60	6.35	8.60	5.10		1.20				2.22	3.3
12	3.90		6.55	9.15	5.0			1.21	1.30	1.3		
13			6.70	9.0	4.7	1.25	1.20					3.3
14	3.90	3.75	7.45	9.0	4.5				1.30	1.41	2.65	
15			7.40	8.6	4.1	1.25	1.20	1.21				3.3
16		3.60	7.80	8.3	3.7				1.30		2.4	
17	4.0		7.45	8.2	3.35	1.25		1.21		2.25		3.2
18		3.50	7.50	8.3	2.90		1.20				2.32	3.1
19	3.45		7.80	8.3	2.80			1.21	1.29	2.60		
20			8.20	8.6	2.35	1.25	1.20					
21	3.50	3.60	8.90	8.35	2.15				1.28	2.5	2.9	3.25
22			9.65	8.70	1.95	1.25	1.20	1.21				
23		3.75	10.25	8.55	1.70				1.25		3.0	2.8
24	3.90		8.25	8.75	1.50	1.25		1.21		2.5		
25		3.80	7.85	8.95	1.40		1.20				3.0	
26	3.60		7.60	9.15	1.35		1.21	1.20	1.25	2.48		3.2
27			7.40	9.25	1.35	1.25	1.21					
28	3.65	3.90	7.0	8.75	1.35				1.25	2.48	3.1	3.0
29			6.65	8.7		1.25	1.21	1.20				
30			6.50	8.1	1.30				1.25		3.05	3.05
31	3.30		6.45					1.20		2.85		

Daily discharge, in second-feet, of Spanish Fork near Lake Shore, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	133	92	126	306	401	2.0	1.5	1.1	1.0	1.9	40	67
2	119	105	136	338	360	1.8	1.5	1.1	1.0	2.3	27	70
3	105	104	164	347	275	1.5	1.5	1.1	1.0	2.7	27	70
4	106	102	203	365	247	1.5	1.5	1.3	1.0	2.4	27	71
5	108	102	215	365	239	1.5	1.5	1.5	1.0	2.0	37	72
6	110	102	219	374	203	1.5	1.5	1.4	1.0	2.0	47	70
7	112	102	255	365	179	1.5	1.2	1.2	1.0	2.0	57	67
8	110	93	320	378	179	1.5	1.0	1.1	1.2	2.0	60	70
9	108	84	338	419	136	1.5	1.0	1.1	1.5	2.0	64	72
10	105	90	311	460	112	1.5	1.0	1.1	1.6	2.0	45	75
11	110	96	306	510	203	1.5	1.0	1.1	1.8	2.0	26	78
12	115	99	324	565	195	1.5	1.0	1.1	2.0	2.0	32	78
13	115	102	338	550	171	1.5	1.0	1.1	2.0	2.6	38	78
14	115	105	406	550	157	1.5	1.0	1.1	2.0	3.1	44	78
15	117	100	401	510	129	1.5	1.0	1.1	2.0	11	39	78
16	120	96	437	482	102	1.5	1.0	1.1	2.0	19	33	75
17	122	93	406	473	81	1.5	1.0	1.1	2.0	27	31	72
18	104	90	410	482	57	1.5	1.0	1.1	1.9	34	30	67
19	87	92	437	482	52	1.5	1.0	1.1	1.9	42	39	69
20	88	94	473	510	31	1.5	1.0	1.1	1.9	40	48	72
21	90	96	540	486	23	1.5	1.0	1.1	1.8	37	57	75
22	98	100	615	520	16	1.5	1.0	1.1	1.6	37	60	63
23	106	105	675	505	9.0	1.5	1.0	1.1	1.5	37	62	52
24	115	106	478	525	4.0	1.5	1.0	1.1	1.5	37	62	58
25	106	108	442	545	3.0	1.5	1.0	1.1	1.5	36	62	65
26	96	110	419	565	2.5	1.5	1.1	1.0	1.5	36	63	72
27	98	112	401	575	2.5	1.5	1.1	1.0	1.5	36	65	67
28	99	115	365	525	2.5	1.5	1.1	1.0	1.5	36	67	62
29	92		334	520	2.2	1.5	1.1	1.0	1.5	42	65	63
30	85		320	464	2.0	1.5	1.1	1.0	1.5	48	64	64
31	78		316		2.0		1.1	1.0		54		65

NOTE.—Daily discharge determined from well-defined discharge rating curve.

Monthly discharge of Spanish Fork near Lake Shore, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet.)	Accuracy.
	Maximum.	Minimum.	Mean.		
January	133	78	106	6,520	A.
February	115	84	99.8	5,540	A.
March	675	126	359	22,100	A.
April	575	306	469	27,900	A.
May	401	2.0	115	7,070	A.
June	2.0	1.5	1.53	91.0	D.
July	1.5	1.0	1.42	88.2	D.
August	1.5	1.0	1.11	68.2	D.
September	2.0	1.0	1.53	91.6	D.
October	54	1.9	20.6	1,270	B.
November	67	26	47.3	2,810	B.
December	78	52	69.5	4,270	B.
The year	675	1.0	107	77,800	

DIAMOND FORK NEAR THISTLE, UTAH.

This station, which is located at a foot bridge about 2½ miles below Thistle, Utah, and about 200 yards above the mouth of the river, was established December 2, 1907, to determine the amount of water available for irrigation and power development in connection with the Strawberry Valley project of the United States Reclamation Service.

As no important ditches take out above or below, the records show the total run-off from the Diamond Fork drainage area.

The gage is an inclined staff near the bridge; its datum has remained unchanged since the station was established.

Discharge measurements are made from the bridge.

The river freezes over during extreme cold periods, but as the winter flow is fairly constant good estimates may be made. The relation between gage height and discharge is unaffected by artificial control. Although the section shifts a great deal throughout the year, many measurements were made in 1910 and the records may be considered fairly good.

Discharge measurements of Diamond Fork near Thistle, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 2	A. B. Purton	20	20	2.28	30.0
21	do	21	40	3.15	165
Apr. 29	do	21	48	3.40	240
May 21	do	20	34	2.85	121
June 21	do	20	34	2.38	44.5
July 23[a]	do	21	18	2.01	22
Aug. 9	do	21	18	2.01	19.9
Sept. 19	do	20	18	2.11	25.3

[a] Wading measurement.

Daily gage height, in feet, of Diamond Fork near Thistle, Utah, for 1910.

[E. T. Cluff, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.3	2.8	.....	2.4	2.2	2.0	.....	2.05	.....	2.05
2	2.3	2.8	3.4	2.4	2.2	2.0	2.0	.....	2.05	.....
3	2.3	.....	3.3	2.4	.....	2.0	.....	2.05	.....	2.05
4	2.3	2.9	3.3	2.4	.....	2.0	2.0	.....	2.05	.....
5	2.35	2.9	3.2	.....	2.2	2.0	.....	2.05	2.05	2.05
6	2.4	2.9	3.1	2.4	2.15	2.0	2.0	.....	.....	.....
7	2.4	2.95	3.1	2.4	2.15	2.0	.....	2.05	2.05	2.05
8	2.4	3.05	.....	2.4	2.15	2.0	2.0	2.05	.....	.....
9	2.45	3.15	3.1	2.4	2.1	2.0	.....	.....	2.05	2.05
10	2.45	.....	3.2	2.4	.....	2.0	2.0	2.05	.....	2.05
11	2.4	3.4	3.2	2.4	2.1	2.0	.....	2.05	2.05	.....
12	2.4	3.6	3.2	2.4	2.1	2.0	2.0	.....	2.05	2.05
13	2.45	3.5	3.1	2.4	2.1	2.0	.....	2.05	.....	.....
14	2.45	3.3	3.1	2.4	2.1	.....	2.0	2.05	2.05	2.05
15	2.45	3.4	.....	2.3	2.1	2.0	.....	2.05	.....	.....
16	2.55	3.4	3.1	2.3	2.1	2.0	2.0	.....	2.05	2.05
17	2.7	.....	3.0	2.3	2.1	2.0	2.1	2.1	.....	2.05
18	3.0	3.5	2.9	2.3	2.1	2.0	.....	.....	2.05	.....
19	3.2	3.45	2.9	2.3	2.1	2.0	2.1	2.05	2.05	2.05
20	3.25	3.4	2.85	2.25	2.1	2.0	.....	.....	.....	.....
21	3.35	3.55	2.85	2.25	2.1	.....	2.1	2.05	2.1	2.05
22	3.4	3.5	.....	2.25	2.1	2.0	2.1	.....	.....	.....
23	3.35	3.4	2.8	2.25	2.1	2.0	2.1	2.05	2.1	2.05
24	3.35	.....	2.7	2.2	.....	2.0	2.05	.....	.....	2.05
25	3.3	3.4	2.7	2.2	2.1	2.0	.....	.....	2.05	.....
26	3.2	3.4	2.6	.....	2.1	2.0	2.05	2.05	2.05	2.05
27	.....	3.4	2.6	2.2	2.1	2.0	2.05	.....	.....	.....
28	3.0	3.5	2.6	2.2	2.1	.....	2.05	2.05	2.05	2.0
29	3.0	3.5	2.55	2.2	2.1	2.0	2.05	2.05	.....	.....
30	2.85	3.5	2.5	2.2	2.1	.....	2.05	.....	2.05	2.0
31	2.85	.....	2.4	.....	.....	2.0	.....	2.05	.....	1.95

NOTE.—Stream frozen over during January and February. Relation between gage heights and discharge probably unaffected by ice during March and December.

Daily discharge, in second-feet, of Diamond Fork near Thistle, Utah, for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	33	100	250	60	38	20	20	24	24	24
2	33	100	238	60	38	20	20	24	24	24
3	33	108	214	60	38	20	20	24	24	24
4	33	117	214	60	38	20	20	24	24	24
5	38	117	192	60	38	20	20	24	24	24
6	43	117	170	60	33	20	20	24	24	24
7	43	126	170	60	33	20	20	24	24	24
8	43	145	170	60	33	20	20	24	24	24
9	49	165	170	60	28	20	20	24	24	24
10	49	200	192	60	28	20	20	24	24	24
11	43	238	192	60	28	20	20	24	24	24
12	43	286	192	60	28	20	20	24	24	24
13	49	262	170	60	28	20	20	24	24	24
14	49	214	170	60	28	20	20	24	24	24
15	49	238	170	48	28	20	20	24	24	24
16	62	238	170	48	28	20	20	26	24	24
17	84	250	150	48	28	20	28	28	24	24
18	135	262	132	48	28	20	28	26	24	24
19	175	250	132	48	28	20	28	24	24	24
20	185	238	124	43	28	20	28	24	26	24
21	206	274	124	43	28	20	28	24	28	24
22	217	262	120	43	28	20	28	24	28	24
23	206	238	116	43	28	20	28	24	28	24
24	206	238	100	38	28	20	24	24	26	24
25	195	238	100	38	28	20	24	24	24	24
26	175	238	86	38	28	20	24	24	24	24
27	155	238	86	38	28	20	24	24	24	22
28	135	262	86	38	28	20	24	24	24	20
29	135	262	79	38	28	20	24	24	24	20
30	108	262	72	38	28	20	24	24	24	20
31	108	.....	60	.....	24	20	.....	24	.....	16

NOTE.—Daily discharge determined from two well-defined discharge rating curves, one applicable Mar. 1 to Apr. 10, the other Apr. 11 to Dec. 31. Discharge interpolated for days on which gage was not read.

Monthly discharge of Diamond Fork near Thistle, Utah, for 1910.

[Drainage area, 157 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	.....	.....	50	0.318	0.37	3,070	D.
February	.....	.....	50	.318	.33	2,780	D.
March	217	33	100	.637	.73	6,150	A.
April	286	100	209	1.33	1.48	12,400	B.
May	250	60	149	.949	1.09	9,160	A.
June	60	38	50.6	.322	.36	3,010	B.
July	38	24	30.0	.191	.22	1,840	A.
August	20	20	20.0	.127	.15	1,230	A.
September	28	20	22.8	.145	.16	1,360	A.
October	28	24	24.3	.155	.18	1,490	A.
November	28	24	24.5	.156	.17	1,460	A.
December	24	16	23.3	.148	.17	1,430	A.
The year	286	16	62.8	.400	5.41	45,400	

NOTE.—Monthly means for January and February estimated by comparison with run off records of Spanish Fork at Thistle and at mouth of canyon.

HOBBLE CREEK NEAR SPRINGVILLE, UTAH.

This station, which is located at a point about 1 mile above the mouth of the canyon, 4 miles southeast of Springville, Utah, and just below the Springville electric power plant, was established March 23, 1904, to determine the amount of water available for irrigation in Utah Valley in connection with the Strawberry Valley project of the United States Reclamation Service. The station is above all diversion ditches and below all tributaries.

Practically no ice forms at the station, the winter flow being largely from springs.

In May, 1909, a flood tore out the old gage and changed the section to such an extent that it was found advisable to change the location of the station. A new vertical staff gage was therefore installed at a point about 1,000 feet upstream from the old gage and about 200 feet below the power plant. All gage heights since June 1, 1909, refer to the new gage.

Measurements are made from a cable and car or by wading.

The bed of the stream at the new section is more nearly permanent than at the old station. A good rating curve has been obtained, and the records at the new station may be considered excellent.

Discharge measurements of Hobble Creek near Springville, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 4	A. B. Purton	14	19	3.60	44.9
July 13	.....do	12	16	3.45	29.2
Sept. 7	.....do	11	14	3.35	23.1

Daily gage height, in feet, of Hobble Creek near Springville, Utah, for 1910.

[E. P. Noe and W. O. Packard, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.45	.....	3.50	4.30	.....	4.00	3.50	3.40	3.30	3.30	3.35	3.35
2	.....	.....	.....	4.30	.....	.....	3.50	.....	.....	3.35	3.35	3.35
3	.....	3.40	.....	.....	.....	.....	.....	3.40	.....	3.35	3.35	3.40
4	.....	.....	3.60	4.30	.....	.....	.....	.....	.....	3.35	3.35	3.35
5	.....	3.35	.....	4.40	4.30	.....	3.40	.....	.....	3.35	3.35	3.35
6	.....	.....	.....	.....	4.30	3.90	3.40	3.40	.....	3.35	3.35	3.35
7	.....	3.40	3.70	4.40	4.20	3.90	.....	.....	3.35	3.35	3.35	3.35
8	.....	.....	.....	4.45	.....	3.90	3.40	3.35	3.35	3.35	3.35	3.35
9	.....	.....	.....	4.50	4.10	3.90	3.40	.....	3.30	3.30	3.35	3.35
10	3.45	.....	3.75	.....	4.10	3.90	.....	3.35	3.25	3.30	3.35	3.40
11	.....	.....	.....	5.00	4.10	3.90	3.40	3.30	3.30	3.30	3.35	3.40
12	.....	3.45	4.00	5.00	4.10	.....	.....	3.30	3.30	3.30	3.35	3.40
13	.....	.....	.....	5.00	4.10	3.90	3.40	3.30	3.30	3.30	3.35	3.40
14	.....	3.45	4.20	4.80	.....	3.90	3.40	.....	3.30	3.35	3.35	3.35
15	3.45	.....	4.30	4.70	.....	.....	.....	3.30	3.35	3.35	3.35	3.30
16	.....	.....	4.50	4.60	4.10	3.90	3.40	.....	3.35	3.35	3.35	3.30
17	3.45	.....	4.50	.....	4.10	3.90	.....	3.30	3.35	3.35	3.35	3.30
18	.....	.....	4.70	4.60	4.10	3.90	3.40	.....	3.35	3.35	3.35	3.30
19	.....	3.45	4.80	4.80	4.10	.....	.....	3.30	3.35	3.35	3.40	3.30
20	.....	.....	.....	5.00	4.10	3.80	3.40	3.30	3.45	3.40	3.40	3.30
21	.....	3.45	5.00	5.20	4.10	3.75	3.40	.....	3.40	3.40	3.35	3.30
22	3.45	.....	5.40	5.10	.....	3.70	.....	3.25	3.40	3.35	3.35	3.30
23	.....	.....	5.40	5.10	4.10	3.60	3.40	3.25	3.35	3.35	3.40	3.30
24	3.45	.....	5.00	.....	.....	3.60	.....	3.30	3.35	3.35	3.35	3.30
25	.....	.....	.....	5.10	4.00	3.50	.....	3.20	3.30	3.35	3.35	3.30
26	.....	.....	4.80	5.10	4.00	.....	.....	.....	3.30	3.35	3.40	3.30
27	.....	.....	.....	.....	.....	3.50	.....	3.30	3.35	3.35	3.35	3.30
28	.....	3.45	4.50	5.10	4.00	3.50	.....	.....	3.35	3.35	3.35	3.30
29	3.45	.....	4.40	5.00	.....	3.50	.....	.....	3.35	3.35	3.35	3.30
30	.....	.....	.....	5.00	4.00	3.50	.....	.....	3.30	3.35	3.35	3.30
31	.....	.....	4.30	.....	4.00	.....	.....	.....	.....	3.35	.....	3.30

Daily discharge, in second-feet, of Hobble Creek near Springville, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	30	28	35	130	228	88	35	26	18	18	22	22
2	30	27	38	130	204	86	35	26	18	22	22	22
3	30	26	42	130	180	84	32	26	18	22	22	26
4	30	24	45	130	155	81	29	26	20	22	22	22
5	30	22	48	145	130	78	26	26	20	22	22	22
6	30	24	52	145	130	76	26	26	20	22	22	22
7	30	26	55	145	115	76	26	24	22	22	22	22
8	30	27	56	153	108	76	26	22	22	22	22	22
9	30	28	58	161	101	76	26	22	18	18	22	22
10	30	28	60	207	101	76	26	22	14	18	22	26
11	30	29	74	253	101	76	26	18	18	18	22	26
12	30	30	88	253	101	76	26	18	18	18	22	26
13	30	30	102	253	101	76	26	18	18	18	22	26
14	30	30	115	214	101	76	26	18	18	22	•22	22
15	30	30	130	196	101	76	26	18	22	22	22	18
16	30	30	161	178	101	76	26	18	22	22	22	18
17	30	30	161	178	101	76	26	18	22	22	22	18
18	30	30	196	178	101	76	26	18	22	22	22	18
19	30	30	214	214	101	70	26	18	22	22	26	18
20	30	30	234	253	101	65	26	18	30	26	26	18
21	30	30	253	296	101	60	26	16	26	26	22	18
22	30	30	343	274	101	55	26	14	26	22	22	18
23	30	30	343	274	101	45	26	14	22	22	26	18
24	30	30	253	274	94	45	26	18	22	22	22	18
25	30	30	234	274	88	35	26	11	18	22	22	18
26	30	30	214	274	88	35	26	14	18	22	26	18
27	30	30	188	274	88	35	26	18	22	22	22	18
28	30	30	161	274	88	35	26	18	22	22	22	18
29	30	.....	145	253	88	35	26	18	22	22	22	18
30	30	.....	138	253	88	35	26	18	18	22	22	18
31	30	.....	130	.....	88	.....	26	18	.....	22	.....	18

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge interpolated for days on which gage height was not read.

Monthly discharge of Hobble Creek near Springville, Utah, for 1910.

[Drainage area, 120 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	30	30	30.0	0.250	0.29	1,840	B.
February	30	22	28.5	.238	.25	1,580	B.
March	343	35	141	1.18	1.36	8,670	A.
April	296	130	212	1.77	1.98	12,600	A.
May	228	88	112	.933	1.08	6,890	A.
June	88	35	65.2	.543	.61	3,880	A.
July	35	26	26.9	.224	.26	1,650	A.
August	26	11	19.5	.162	.19	1,200	A.
September	30	14	20.6	.172	.19	1,230	A.
October	26	18	21.5	.179	.21	1,320	A.
November	26	22	22.5	.188	.21	1,340	A.
December	26	18	20.5	.171	.20	1,260	A.
The year	343	11	60.1	.500	6.83	43,500	

MAPLE CREEK NEAR SPRINGVILLE, UTAH.

This station, which is located about half a mile above the mouth of Maple Creek canyon and about 4 miles southeast of Springfield post office, in the NE. ¼ NW. ¼ sec. 13, T. 8 S., R. 3 E., Salt Lake base and meridian, was established November 10, 1910.

The drainage area at this point is approximately 6,880 acres. A staff gage is fastened to the side of a flume 3.8 feet wide on the inside and about 3½ feet high.

Discharge measurements at low and moderate stages are made by wading at the upper end of the flume; flood measurements are made from a board across the flume.

The creek is frozen during the winter.

The following discharge measurement was made by E. C. La Rue:

November 10, 1910: Width, 3.6 feet; area of section, 1.28 square feet; gage height, 1.43 feet; discharge, 1.39 second-feet.

Daily gage height, in feet, of Maple Creek near Springville, Utah, for 1910.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		1.45	11	1.43	1.50	21	1.30	1.48
2		1.45	12	1.43	1.50	22	1.48	1.48
3		1.49	13	1.43	1.50	23	1.46	1.48
4		1.48	14	1.43	1.49	24	1.44	1.48
5		1.48	15	1.43	1.48	25	1.44	1.46
6		1.48	16	1.44	1.48	26	1.45	1.34
7		1.48	17	1.44	1.48	27	1.45	1.34
8		1.48	18	1.44	1.48	28	1.46	1.46
9		1.48	19	1.47	1.48	29	1.46	1.46
10	1.43	1.49	20	1.45	1.48	30	1.45	1.48
						31		1.48

PROVO RIVER ABOVE TELLURIDE POWER CO.'S DAM NEAR PROVO, UTAH.

This station, which is located about 1 mile above the Telluride Power Co.'s dam and about 4 miles above the mouth of the canyon, and about 11 miles from Provo, was established February 1, 1905, to determine the amount of water available for irrigation in Utah Valley.

The station is below all tributaries, South Fork entering one-fourth mile above the station. Some water is diverted above the station for irrigation in Heber Valley, and all the normal low-water flow is diverted for irrigation below the station. The Telluride Power Co. diverts water about a mile below the station for power development, but returns it to the river at the mouth of the canyon.

The equipment consists of a cable and car and an inclined staff gage. The gage datum was changed July 24, 1908, when the station was established at a point one-fourth mile above the old site.

The relation between gage height and discharge is not affected by ice or by artificial control above.

The most recent information regarding conditions at this station indicates that there is no backwater from the dam below, but that the channel has become very unstable, requiring the use of many discharge rating curves. Results obtained at this station for 1909–10 are not good.

Discharge measurements of Provo River at Telluride Power Co.'s dam, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 9	E. S. Fuller	78	181	3.10	695
17	C. C. Jacobs	72	184	3.25	704
July 18	Fuller and Canfield	74	87.9	2.00	244

Daily gage height, in feet, of Provo River near Provo, Utah, for 1910.

[Frank Dusenberry, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.2	2.3	2.3	3.0	4.25	3.8	1.95	2.1	1.9	2.1	2.1	2.25
2	3.7	2.35	2.8	3.0	4.0	3.7	2.0	2.0	1.9	2.1	2.1	2.2
3	2.85	1.8	3.1	3.1	3.65	3.6	2.0	2.0	1.9	2.05	2.15	2.2
4	2.65	1.9	3.3	3.0	3.75	3.45	1.95	2.0	1.9	2.05	2.15	2.25
5	2.4	2.0	3.3	3.5	3.6	3.3	2.0	2.05	1.9	2.05	2.15	2.25
6	2.3	2.15	3.3	3.1	3.5	3.5	2.0	2.05	1.9	2.05	2.15	2.25
7	2.5	2.0	3.0	2.9	3.25	3.85	2.0	1.95	1.9	2.1	2.1	2.2
8	2.55	2.25	2.9	3.0	3.55	2.7	1.9	1.95	1.9	2.05	2.15	2.2
9	2.6	2.25	3.0	3.15	3.65	2.55	1.9	1.9	1.9	2.05	2.2	2.2
10	2.5	2.35	2.8	3.2	3.95	2.35	1.9	1.95	1.9	2.05	2.15	2.25
11	2.55	2.35	2.7	3.45	4.65	2.35	2.0	1.9	1.9	2.1	2.15	2.4
12	2.5	2.25	2.65	3.55	4.6	2.3	1.9	1.95	1.9	2.1	2.15	2.4
13	2.4	2.4	2.7	3.5	4.5	2.35	2.05	1.9	1.9	2.1	2.15	2.3
14	2.7	2.4	3.0	3.5	4.6	2.4	2.0	1.9	2.0	2.1	2.15	2.2
15	2.6	2.9	3.15	3.45	4.5	2.35	2.0	1.9	2.0	2.1	2.2	2.15
16	2.45	2.4	3.25	3.3	4.0	2.3	2.0	1.9	2.05	2.1	2.2	2.2
17	2.3	2.2	3.3	3.2	3.95	2.2	2.05	1.9	2.1	2.1	2.15	2.3
18	2.2	2.4	3.2	3.3	3.6	2.15	2.0	1.9	2.1	2.15	2.2	2.25
19	2.15	2.3	3.4	3.5	3.5	2.2	2.0	1.85	2.1	2.2	2.25	2.25
20	2.4	2.3	3.3	3.65	3.25	2.1	2.0	1.85	2.1	2.2	2.2	2.3
21	2.45	2.4	3.5	3.95	3.35	2.0	2.0	1.85	2.05	2.2	2.2	2.25
22	2.45	2.45	3.65	3.95	3.35	2.1	1.95	1.9	2.05	2.15	2.25	2.2
23	2.55	2.4	4.0	3.8	3.3	2.1	1.95	1.85	2.05	2.15	2.3	2.15
24	2.55	2.5	3.6	3.9	3.35	1.95	2.0	1.8	2.05	2.1	2.3	2.15
25	2.65	2.5	3.5	4.15	3.35	2.0	1.95	1.9	2.05	2.1	2.25	2.3
26	2.35	2.3	3.4	4.45	3.7	1.95	1.85	1.9	2.05	2.15	2.25	2.2
27	2.3	2.4	3.35	4.65	3.6	2.0	1.8	1.9	2.1	2.1	2.25	2.2
28	2.35	2.4	3.4	4.7	3.5	1.95	1.9	1.9	2.1	2.1	2.25	2.2
29	2.3	.....	3.45	4.6	3.65	2.0	2.0	1.9	2.05	2.1	2.25	2.15
30	2.1	.....	3.2	4.4	4.0	1.95	2.0	1.9	2.05	2.1	2.25	2.15
31	2.25	.....	3.0	.....	3.8	.....	2.0	1.9	.....	2.1	.....	2.2

Daily discharge, in second-feet, of Provo River near Provo, Utah, for 1909–10.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	240	285	285	470	1,000	1,650	1,570	250	640	450	410	430
2	240	300	285	530	850	1,830	1,460	290	515	430	370	570
3	240	300	300	620	900	2,310	1,460	275	490	450	335	410
4	240	318	300	670	1,100	2,850	1,510	275	450	450	335	370
5	270	318	335	550	1,325	3,410	1,410	250	515	470	410	352
6	760	240	335	510	1,325	3,550	1,360	305	490	430	410	300
7	670	240	352	450	1,400	3,620	1,210	322	490	450	390	335
8	375	352	352	450	1,500	3,280	1,010	290	490	410	390	410
9	375	270	300	470	1,500	2,590	910	275	515	430	370	470
10	375	270	255	490	1,770	2,530	860	275	450	410	530	370
11	910	285	240	490	1,890	2,470	810	290	450	410	410	335
12	495	370	240	490	1,600	2,350	715	305	450	430	370	352
13	455	370	240	510	1,450	2,290	535	275	450	370	352	410
14	1,310	335	240	530	1,400	2,290	375	275	450	390	410	370
15	1,500	318	370	670	1,425	2,110	340	250	450	410	370	300
16	760	335	352	785	1,450	2,110	358	340	450	370	390	270
17	620	335	370	900	1,350	2,170	322	275	450	390	390	185
18	570	318	430	1,175	1,300	2,110	322	290	450	370	370	240
19	530	335	430	1,350	1,350	2,350	305	305	340	370	410	300
20	670	335	430	1,275	1,475	2,110	322	290	322	370	470	300
21	710	335	390	975	1,550	1,930	322	290	305	370	318	285
22	710	300	370	830	1,650	1,750	305	410	305	370	530	335
23	670	300	370	810	1,650	1,750	290	340	392	370	470	335
24	530	335	410	900	1,600	1,810	305	322	340	370	470	352
25	410	318	410	850	1,450	1,750	290	340	375	352	470	370
26	410	300	430	900	1,400	1,870	305	340	490	352	470	335
27	370	270	410	1,150	1,550	1,720	275	358	470	370	470	335
28	300	285	450	1,225	1,800	1,750	275	340	390	352	370	335
29	300	.....	450	1,200	1,710	1,690	275	322	450	335	352	300
30	300	.....	470	1,000	1,680	1,630	260	392	490	335	410	335
31	335	.....	450	.....	1,710	.....	275	375	.....	410	.....	300
1910.												
1	1,200	335	335	615	1,225	995	225	270	210	270	270	318
2	950	352	530	615	1,100	950	240	240	210	270	270	300
3	550	180	665	665	922	895	240	240	210	255	285	300
4	470	210	755	615	972	828	225	240	210	255	285	318
5	370	240	755	850	895	755	240	255	210	255	285	318
6	335	285	755	665	850	850	240	255	210	255	285	318
7	410	240	615	570	732	1,025	240	225	210	270	270	300
8	430	318	570	615	872	490	210	225	210	255	285	300
9	450	318	615	688	922	430	210	210	210	255	300	300
10	410	352	530	710	1,080	352	210	225	210	255	285	318
11	430	352	490	828	1,425	352	240	210	210	270	285	370
12	410	318	470	872	1,400	335	210	225	210	270	285	370
13	370	370	490	850	1,350	352	255	210	210	270	285	335
14	490	370	615	850	1,400	370	240	210	240	270	285	300
15	450	570	688	828	1,350	352	240	210	240	270	300	285
16	390	370	732	755	1,100	335	240	210	255	270	300	300
17	335	300	755	710	1,080	300	255	210	270	270	285	335
18	300	370	710	755	895	285	240	210	270	285	300	318
19	285	335	805	850	850	300	240	195	270	300	318	318
20	370	335	755	922	732	270	240	195	270	300	300	335
21	390	370	850	1,080	780	240	240	195	255	300	300	318
22	390	390	922	1,080	780	270	225	210	255	285	318	300
23	430	370	1,100	995	755	270	225	195	255	285	335	285
24	430	410	895	1,050	780	225	240	180	255	270	335	285
25	470	410	850	1,175	780	240	225	210	255	270	318	335
26	352	335	805	1,325	950	225	195	210	255	285	318	300
27	335	370	780	1,425	895	240	180	210	270	270	318	300
28	352	370	805	1,450	850	225	210	210	270	270	318	300
29	335	.....	828	1,400	922	240	240	210	255	270	318	285
30	270	.....	710	1,300	1,100	225	240	210	255	270	318	285
31	318	.....	615	.....	995	.....	240	210	.....	270	.....	300

NOTE.—Daily discharge during 1909 and 1910 determined from a set of 3 parallel curves drawn through discharge measurements made during 1909–10 and 1911; curve 1, used Jan. 1 to 14, 1909, and June 8 to July 13, 1909; curve 2, used Jan. 15 to June 7, 1909, and Oct. 25 to Dec. 31, 1909; curve 3, used Jan. 1 to Dec. 31, 1910. July 14 to Oct. 24, 1909, indirect method used.

Monthly discharge of Provo River near Provo, Utah, for 1909–1910.

[Drainage area, 640 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1909.							
January	1,500	240	537	0.839	0.97	33,000	D.
February	370	240	310	484	.50	17,200	D.
March	470	240	356	.556	.64	21,900	D.
April	1,350	450	774	1.21	1.35	46,100	C.
May	1,890	850	1,460	2.28	2.63	89,800	C.
June	3,620	1,630	2,250	3.52	3.93	134,000	C.
July	1,570	260	656	1.02	1.18	40,300	C.
August	410	250	307	.480	.55	18,900	C.
September	640	305	444	.694	.77	26,400	C.
October	470	335	395	.617	.71	24,300	B.
November	530	318	407	.636	.71	24,200	C.
December	570	185	345	.539	.62	21,200	C.
The year	3,620	185	687	1.07	14.56	497,000	
1910.							
January	1,200	270	435	0.680	0.78	26,700	C.
February	570	180	341	.533	.56	18,900	C.
March	1,100	335	703	1.10	1.27	43,200	C.
April	1,450	570	904	1.41	1.57	53,800	B.
May	1,425	732	992	1.55	1.79	61,000	C.
June	1,025	225	441	.690	.77	26,200	C.
July	255	180	230	.359	.41	14,100	B.
August	270	180	217	.339	.39	13,300	C.
September	270	210	238	.372	.42	14,200	C.
October	300	255	271	.423	.49	16,700	C.
November	335	270	299	.467	.52	17,800	C.
December	370	285	311	.486	.56	19,100	C.
The year	1,450	180	449	.702	9.53	325,000	

TRIBUTARIES OF THE JORDAN.

LITTLE COTTONWOOD CREEK NEAR SALT LAKE CITY, UTAH.

Little Cottonwood Creek is the most southern of the streams tributary to Jordan River on which records have been obtained.

The flow is measured over two 15-foot Cippoletti weirs located near the mouth of the canyon.

Daily discharge, in second-feet, of Little Cottonwood Creek near Salt Lake City, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	Aug.	Sept.	Oct.	Nov.	Dec.
1	21.3	19.4	18.5	55.0	.....	14.2	17.6	18.5	13.0
2	23.2	19.4	19.4	57.5	.....	15.0	18.5	18.5	12.6
3	24.1	20.4	21.3	60.2	.....	15.0	19.4	18.5	12.6
4	21.3	20.4	23.2	62.9	15.0	15.0	21.3	17.6	12.6
5	21.3	20.4	25.2	62.9	15.9	15.9	20.4	17.6	11.9
6	19.4	19.4	25.2	65.6	15.0	15.0	a 20.1	17.6	11.1
7	21.3	19.4	26.1	65.6	15.0	15.0	a 19.7	17.6	16.8
8	24.1	18.5	28.2	68.4	15.0	15.0	19.4	17.6	15.9
9	23.2	14.2	27.2	71.2	14.2	14.2	19.4	17.6	15.9
10	23.2	14.2	27.2	76.8	14.2	14.2	18.4	17.6	a 15.9
11	23.2	15.9	29.2	104.0	14.2	14.2	17.6	15.9	15.9
12	22.3	17.6	31.3	110.0	13.4	13.4	15.9	15.9	15.9
13	22.3	17.6	35.7	.....	14.2	14.2	17.6	17.6	14.2
14	23.2	15.9	40.3	.....	14.2	14.2	17.6	17.6	14.2
15	22.3	15.9	45.0	.....	15.0	15.0	18.5	17.6	13.4
16	21.3	15.9	49.9	.....	15.9	15.9	19.4	17.6	13.4
17	21.3	15.0	57.5	.....	17.6	17.6	20.4	14.2	12.6
18	23.2	14.2	65.6	.....	17.6	17.6	20.4	14.2	12.6
19	21.3	15.0	71.2	.....	18.5	18.5	21.3	15.9	11.9
20	23.2	15.9	73.9	.....	20.4	20.4	24.1	15.9	11.1
21	21.3	15.0	88.7	.....	20.4	20.4	24.1	17.6	9.6
22	21.3	17.6	88.7	.....	20.4	20.4	25.2	15.0	9.6
23	20.4	17.6	94.7	.....	21.3	21.3	22.3	17.6	8.9
24	19.4	15.9	88.7	.....	21.3	21.3	21.3	15.9	8.9
25	19.4	15.9	71.2	.....	21.3	21.3	19.4	15.9	8.9
26	20.4	18.5	68.4	.....	19.4	19.4	19.4	15.9	8.9
27	21.3	17.6	65.6	.....	14.2	16.8	19.4	14.2	8.9
28	20.4	17.6	62.9	.....	14.2	16.8	19.4	14.2	8.2
29	19.4	.....	56.3	.....	14.2	17.6	20.4	14.2	8.2
30	20.4	.....	60.2	.....	13.4	17.6	19.4	13.4	9.6
31	19.4	.....	52.4	.....	15.0	.....	19.4	.....	9.6

a Interpolated by engineers of United States Geological Survey to complete record for month.

Monthly discharge of Little Cottonwood Creek near Salt Lake City, Utah, for 1910.

[Drainage area, 12.7 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	24.1	19.4	21.6	1.70	1.96	1,330
February	20.4	14.2	17.2	1.35	1.41	955
March	94.7	18.5	49.6	3.91	4.51	3,050
Apr. 1–12	110	55.0	71.7	5.69	2.54	1,710
Aug. 4–31	21.3	13.4	16.4	1.29	1.34	911
September	21.3	13.4	16.7	1.31	1.46	994
October	25.2	15.9	19.9	1.57	1.81	1,220
November	18.5	13.4	16.5	1.30	1.45	982
December	16.8	8.2	12.0	.945	1.09	738
The period	.....	.....	.....	.....	.....	11,900

BIG COTTONWOOD CREEK NEAR SALT LAKE CITY, UTAH.

Big Cottonwood Creek, the largest tributary of Jordan River, rises near Clayton Peak, which reaches an elevation of over 12,000 feet. Its headwaters are very mountainous and heavily timbered.

The discharge is measured near the mouth of the canyon by means of a compound weir, which serves not only to measure the water, but

to distribute it among the various claimants. The weir is just below the power plant of the Utah Power Co., the operation of which causes a diurnal fluctuation in the discharge.

Daily discharge, in second-feet, of Big Cottonwood Creek near Salt Lake City, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	61.7	50.5	50.5	99.5	275	383	120	82.0	54.2	46.9	48.1	42.3
2	61.7	55.4	49.3	103	234	390	120	77.8	52.9	69.6	48.1	43.5
3	59.2	44.6	50.5	107	212	383	104	76.4	52.9	55.4	48.1	43.5
4	66.9	46.9	57.9	107	216	332	117	75.0	55.4	54.2	46.9	43.5
5	57.9	45.8	64.3	106	199	305	117	75.0	51.7	52.9	42.3	40.1
6	59.2	48.1	66.9	104	182	307	115	73.6	52.9	51.7	43.5	41.2
7	59.2	51.7	79.2	106	195	301	86.2	72.3	51.7	50.5	48.1	40.1
8	59.2	49.3	83.4	115	206	292	93.5	69.6	51.7	49.3	46.9	42.3
9	59.2	46.9	82.0	121	254	260	101	63.0	50.5	48.1	48.1	41.2
10	51.7	48.1	83.4	138	310	254	93.5	63.0	50.5	49.3	48.1	41.2
11	56.6	46.9	80.6	155	355	250	87.7	61.7	48.1	49.3	44.6	41.2
12	56.6	45.8	77.8	175	371	250	84.8	61.7	51.7	55.4	44.6	49.3
13	56.6	43.5	77.8	173	387	242	93.5	64.3	50.5	56.6	44.6	44.6
14	57.9	45.8	83.4	167	376	240	83.4	63.0	50.5	52.9	44.6	45.8
15	57.9	45.8	87.7	150	341	220	70.9	64.3	51.7	51.7	46.9	44.6
16	57.9	44.6	89.1	141	279	204	93.5	61.7	55.4	49.3	45.8	42.3
17	56.6	44.6	96.5	133	242	204	83.4	60.4	55.4	56.6	[a] 43.0	43.5
18	64.3	48.1	103	141	269	197	79.2	59.2	52.9	50.5	40.1	41.2
19	54.2	50.5	107	167	277	197	79.2	59.2	51.7	66.9	42.3	41.2
20	51.7	46.9	107	197	281	171	80.6	59.2	52.9	54.2	42.3	44.6
21	51.7	48.1	120	206	258	171	77.8	55.4	50.5	55.4	41.2	43.5
22	55.4	50.5	146	204	224	167	77.8	56.6	50.5	52.9	42.3	37.9
23	46.9	49.3	150	224	265	166	76.4	56.6	49.3	54.2	49.3	40.1
24	51.7	46.9	136	[a]244	318	160	70.9	56.6	50.5	52.9	[a] 48.1	41.2
25	56.6	50.5	126	[a]264	327	336	72.3	57.9	49.3	51.7	[a] 46.9	40.1
26	51.7	48.1	113	[a]284	303	146	72.3	55.4	48.1	51.7	45.8	44.6
27	50.5	46.9	109	[a]304	307	145	76.4	54.2	48.1	52.9	36.8	44.6
28	50.5	46.9	107	[a]324	307	131	80.6	56.6	48.1	50.5	40.1	44.6
29	56.6	.....	99.5	343	336	128	77.8	51.7	48.1	49.3	40.1	36.8
30	51.7	.....	95.0	323	355	125	75.0	52.9	46.9	49.3	42.3	41.2
31	50.5	.....	93.5	.....	380	.....	69.6	54.2	.....	50.5	.....	36.8

[a] Interpolated by engineers of United States Geological Survey to complete record for month.

Monthly discharge of Big Cottonwood Creek near Salt Lake City, Utah, for 1910.

[Drainage area, 48.5 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	66.9	50.5	56.1	1.16	1.34	3,450
February	55.4	43.5	47.8	.986	1.03	2,650
March	150	49.3	92.7	1.91	2.20	5,700
April	343	99.5	181	3.73	4.16	10,800
May	387	182	285	5.88	6.78	17,500
June	390	125	235	4.85	5.41	14,000
July	120	69.6	88.1	1.82	2.10	5,420
August	82	51.7	62.9	1.30	1.50	3,870
September	55.4	46.9	51.2	1.06	1.18	3,050
October	69.6	46.9	53.0	1.09	1.26	3,260
November	49.3	36.8	44.7	.922	1.03	2,660
December	49.3	36.8	42.2	.870	1.00	2,590
The year	390	36.8	103.5	2.13	28.99	75,000

MILL CREEK NEAR SALT LAKE CITY, UTAH.

Mill Creek drains a narrow basin extending to the crest of the Wasatch Range. Measurements are made by means of a 12.5-foot Cippoletti weir, located near the mouth of the canyon.

Daily discharge, in second-feet, of Mill Creek near Salt Lake City, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	16.8	14.9	14.9	22.9	39.5	44.8	27.3	18.7	16.8	15.3	15.3	13.0
2	16.8	14.9	14.9	22.9	39.5	44.8	22.9	18.7	16.8	15.3	15.3	13.0
3	16.8	14.9	14.9	25.1	39.5	44.8	22.9	18.7	16.8	15.3	15.3	13.0
4	16.8	14.9	14.9	27.3	34.4	32.0	22.9	18.7	16.8	15.3	15.3	13.0
5	13.0	14.9	18.7	27.3	34.4	32.0	22.9	[a] 18.7	16.8	15.3	15.3	13.0
6	8.1	14.9	18.7	27.3	34.4	32.0	22.9	18.7	16.8	15.3	15.3	13.0
7	16.8	14.9	18.7	27.3	34.4	32.0	22.9	18.7	16.8	15.3	15.3	13.0
8	16.8	14.9	18.7	27.3	34.4	32.0	22.9	18.7	16.8	15.3	15.3	13.0
9	16.8	14.9	18.7	29.7	34.4	32.0	22.9	18.7	16.8	15.3	15.3	13.0
10	16.8	14.9	18.7	29.7	42.1	32.0	22.9	18.7	16.8	15.3	15.3	16.8
11	16.8	14.9	18.7	29.7	44.8	32.0	22.9	18.7	16.8	15.3	15.3	16.8
12	16.8	15.3	22.9	29.7	44.8	32.0	22.9	18.7	16.8	15.3	15.3	16.8
13	16.8	15.3	22.9	29.7	44.8	32.0	22.9	18.7	16.8	14.9	15.3	16.8
14	16.8	15.3	22.9	34.4	32.0	32.0	22.9	18.7	16.8	14.9	15.3	16.8
15	15.3	15.3	25.1	34.4	32.0	29.7	22.9	18.7	16.8	14.9	15.3	16.8
16	15.3	15.3	25.1	34.4	32.0	29.7	22.9	18.7	16.8	14.9	15.3	16.8
17	15.3	15.3	25.1	37.0	32.0	29.7	22.9	18.7	16.8	14.9	15.3	16.8
18	14.9	15.3	25.1	37.0	32.0	27.3	20.8	18.7	16.8	14.9	15.3	16.8
19	14.9	15.3	25.1	37.0	32.0	27.3	20.8	18.7	15.3	14.9	15.3	16.8
20	14.9	15.3	25.1	37.0	32.0	27.3	20.8	18.7	15.3	14.9	15.3	16.8
21	14.9	15.3	25.1	37.0	42.1	27.3	20.8	18.7	15.3	14.9	15.3	16.8
22	14.9	15.3	25.1	37.0	42.1	27.3	20.8	18.7	15.3	14.9	15.3	16.8
23	14.9	15.3	22.9	37.0	42.1	27.3	20.8	18.7	15.3	14.9	15.3	16.8
24	14.9	15.3	22.9	37.0	42.1	27.3	20.8	18.7	15.3	14.9	15.3	14.9
25	14.9	15.3	22.9	37.0	42.1	27.3	20.8	18.7	15.3	14.9	15.3	14.9
26	14.9	14.9	22.9	37.0	42.1	27.3	20.8	16.8	15.3	14.9	14.9	14.9
27	14.9	14.9	22.9	37.0	42.1	27.3	20.8	16.8	15.3	14.9	14.9	14.9
28	14.9	14.9	22.9	42.1	42.1	27.3	20.8	16.8	15.3	14.9	14.9	14.9
29	14.9	.....	22.9	42.1	42.1	27.3	20.8	16.8	15.3	14.9	14.9	14.9
30	14.9	.....	22.9	39.5	42.1	27.3	20.8	16.8	15.3	15.3	14.9	14.9
31	14.9	.....	22.9	.....	44.8	.....	20.8	16.8	.....	15.3	.....	14.9

[a] Estimated.

Monthly discharge of Mill Creek near Salt Lake City, Utah, for 1910.

[Drainage area, 21.3 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	16.8	8.1	15.4	0.723	0.83	947
February	15.3	14.9	15.1	.709	.74	839
March	25.1	14.9	21.5	1.01	1.16	1,320
April	42.1	22.9	33.0	1.55	1.73	1,960
May	44.8	32.0	38.4	1.80	2.08	2,360
June	44.8	27.3	31.0	1.46	1.63	1,840
July	27.3	20.8	22.1	1.04	1.20	1,360
August	18.7	16.8	18.3	.859	.99	1,130
September	16.8	15.3	16.2	.761	.85	964
October	15.3	14.9	15.1	.709	.82	928
November	15.3	14.9	15.2	.714	.80	904
December	16.8	13.0	15.2	.714	.82	935
The year	44.8	8.1	21.4	1.00	13.65	15,500

NOTE.—Discharge Aug. 5 has been interpolated by United States Geological Survey to complete month.

PARLEYS CREEK NEAR SALT LAKE CITY, UTAH.

Parleys Creek is formed by the junction of two forks, which together drain nearly 8 miles of the crest of the Wasatch Range, and empties into Jordan River near the southern limits of Salt Lake City.

Measurements are made by means of two 10-foot Cippoletti weirs, located above the intakes of the city waterworks.

Daily discharge, in second-feet, of Parleys Creek near Salt Lake City, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	32.1	18.3	19.6	70.4	.....	47.3	27.5	19.0	a 13.2	12.2	12.2	10.5
2	27.5	15.2	21.0	75.6	.....	45.5	27.5	19.0	a 13.0	19.6	12.2	10.5
3	24.5	8.9	30.5	83.0	.....	44.6	26.7	19.0	a 12.8	15.2	11.6	10.5
4	22.4	7.4	36.9	76.6	.....	42.9	26.7	19.0	a 12.6	14.5	11.6	10.5
5	12.8	8.9	60.4	79.8	.....	40.3	26.0	19.0	a 12.3	14.5	11.6	10.5
6	13.9	11.6	66.3	.....	.....	39.4	23.8	18.3	a 12.0	14.5	11.6	10.5
7	16.4	16.4	a 64.7	.....	.....	39.4	23.1	17.7	a 11.7	14.5	11.6	10.5
8	19.7	15.8	a 63.1	.....	.....	38.6	21.7	17.0	a 11.4	13.9	11.6	10.5
9	19.7	16.4	a 61.6	.....	.....	37.8	21.1	16.4	11.1	13.9	11.6	10.5
10	19.7	16.4	a 60.0	.....	.....	33.7	21.7	16.4	11.6	13.9	11.6	11.1
11	20.3	16.4	58.4	.....	.....	33.7	22.4	16.4	12.2	13.9	11.6	12.2
12	19.6	17.0	58.4	.....	.....	33.7	23.1	16.4	12.2	15.2	11.6	12.8
13	19.0	17.0	62.4	.....	.....	33.7	22.4	16.4	11.6	13.4	11.6	12.2
14	19.6	18.3	69.4	.....	.....	32.9	23.1	16.4	12.2	13.4	11.6	12.2
15	19.0	17.0	74.5	.....	.....	32.1	23.1	15.8	12.2	13.4	11.6	10.5
16	17.7	10.5	76.6	.....	.....	31.3	23.1	15.8	11.1	12.8	11.6	10.5
17	16.4	13.4	78.7	.....	.....	29.7	22.4	15.2	13.4	13.4	11.6	10.5
18	16.4	15.8	86.3	.....	.....	29.0	26.7	15.2	12.8	15.8	11.6	10.5
19	16.4	15.8	90.7	.....	.....	27.5	26.7	14.5	12.2	14.5	12.8	10.5
20	16.4	15.8	97.5	.....	62.4	27.5	26.0	14.5	12.2	14.5	11.1	10.5
21	16.4	17.0	103	.....	62.4	26.7	24.5	13.9	12.2	13.4	11.6	10.5
22	17.0	15.8	108	.....	61.4	26.7	22.4	13.9	12.2	13.4	11.6	5.6
23	17.0	15.8	115	.....	60.4	26.0	22.4	13.4	12.2	13.4	11.6	5.6
24	17.7	17.0	98.6	.....	59.4	26.0	19.0	13.4	12.2	12.8	12.2	6.5
25	16.4	18.3	87.4	.....	59.4	26.0	15.8	13.4	12.2	12.8	12.2	6.5
26	17.0	18.3	89.6	.....	56.5	26.0	16.4	13.4	12.2	12.2	12.2	5.6
27	12.2	19.7	79.8	.....	52.8	26.0	20.3	13.4	12.2	12.2	8.4	5.6
28	14.5	17.0	84.1	.....	51.8	26.7	20.3	13.4	12.2	12.2	10.8	7.4
29	18.3	.....	79.8	.....	50.0	28.8	20.3	13.4	12.2	12.2	10.5	8.9
30	18.3	.....	75.6	.....	49.1	28.2	19.6	13.4	12.2	12.2	10.5	10.0
31	18.3	.....	70.4	.....	49.1	.....	19.0	13.4	.....	12.2	.....	11.6

a Discharge interpolated by engineers of United States Geological Survey to complete record for months.

Monthly discharge of Parleys Creek near Salt Lake City, Utah, for 1910.

[Drainage area, 50.1 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	32.1	12.2	18.6	0.371	0.43	1,140
February	19.7	7.4	15.4	.307	.32	855
March	115	19.6	71.9	1.44	1.66	4,420
June	47.3	26.0	32.9	.659	.74	1,960
July	27.5	19.0	22.7	.453	.52	1,400
August	19.0	13.4	15.7	.313	.36	965
September	13.2	11.1	12.2	.244	.27	726
October	19.6	12.2	13.7	.273	.31	842
November	12.8	8.4	11.5	.230	.26	684
December	12.8	5.6	9.74	.194	.22	599
The period						13,600

EMIGRATION CREEK NEAR SALT LAKE CITY, UTAH.

Emigration Creek is tributary to Parleys Creek just below the mountain front. Its waters are used for the water supply of Salt Lake City.

Discharge is total flow over two Cippoletti weirs, 2.5 and 5 feet in length, respectively, located 600 feet below the dam at the mouth of the canyon.

Daily discharge, in second-feet, of Emigration Creek near Salt Lake City, Utah, for 1909–10.

Day.	Jan.	Feb.	Mar.	Nov.	Dec.	Day.	Jan.	Feb.	Mar.	Nov.	Dec.
1909.						1909.					
1	2.40			5.40		16					
2						17		5.80		5.10	
3	2.40					18					
4		5.80				19					
5						20					3.15
6						21				5.80	
7	4.85			5.10		22		5.80			
8		5.80	5.80		4.86	23					
9						24					
10						25					
11						26					3.15
12		5.80				27					
13	2.40					28					
14	5.80		7.83			29	4.85			3.99	
15					3.15	30					
						31	5.80				

NOTE.—Probably no record kept April to October.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	11.2							3.16				2.39
2										8.94		
3	4.86							2.97				
4		3.99					4.86		3.16			
5								2.97				
6		3.99									2.97	
7	3.99											
8												
9	4.86	3.99								3.16		
10							4.86					
11		3.99							2.39			
12	4.86											
13							4.86					2.39
14		4.86						3.16			2.97	
15							4.86					
16										3.57		
17	3.99						4.86	2.39				
18							3.99		3.16			
19	3.99						3.99	1.72				2.39
20											2.39	
21						5.79						
22	3.99						3.57	1.72				
23	3.99									3.99		
24												
25							3.16		3.16			
26						6.81						
27							3.16				2.39	2.39
28	4.86					5.79		1.72				
29							3.16					
30										3.16		
31												

NOTE.—No record March, April, and May.

SEVIER LAKE BASIN.[1]

GENERAL FEATURES.

The lowest depression of the Sevier Desert has probably been occupied by a lake from the date of the earliest exploration nearly to the present time, but precise information in regard to it dates from 1872, when its form and extent and its relation to Sevier River were determined by Lieut. R. L. Hoxie, in charge of one of the field parties of the Wheeler Survey. In 1872 the lake was about 28 miles long and its water surface measured 188 square miles; its maximum depth at that time is said to have been about 15 feet, the northern part being deeper than the southern.

In January, 1880, the bed of the lake was nearly dry and was explored by Willard D. Johnson, who was able to travel on foot across a bed of salt where the water had before been deepest. The only direct feeder of the lake is Sevier River.

The desiccation of this lake is to be ascribed to human agency. The water of its sole tributary flows for nearly 200 miles through valleys containing more or less arable land and has gradually been monopolized by the agriculturist for the purpose of irrigation. The water that still reaches the lake during the spring freshets, caused by the melting of snow on the plateaus and mountains, represents an economic loss that should as far as possible be stopped. In 1880, and several preceding years, the water of the river was so nearly all utilized by the irrigators that the lake dried up; since that time, in spite of probable increased use for irrigation, the surplus has again accumulated. In the autumns of 1908 and 1909 a lake existed, but its margin was separated from the shore line of 1872 by a flat, miry belt.

The water of the lake is too saline to be used as a supply for live stock.

Sevier River is formed by the junction of its South and East forks, which rise in Garfield and Kane counties, in southern Utah, and meet near Junction. The river flows northeastward to a point near Gunnison, northwestward nearly to Leamington, then turns sharply to southwest toward Sevier Lake; it is more than 200 miles long, measured by general course, and drains an area about 5,000 square miles in extent, above the lower end of Sevier Valley. In any ordinary region the Sevier would not be designated by the name of river; nevertheless, it is the largest stream between Great Salt Lake and the Colorado.

The river occupies a long, narrow basin and receives few tributaries, San Pitch River and Salina Creek being the most important.

[1] Abstracted from Gilbert, G. K., Lake Bonneville: Mon. U. S. Geol. Survey, vol. 1, 1890, pp. 224–228; and Meinzer, O. E., Ground water in Juab, Millard and Iron counties, Utah: Water-Supply Paper U. S. Geol. Survey No. 277, 1911, pp. 119–120.

Salina Creek, which enters about 15 miles above Gunnison, is characterized by rapid run-off and during flood season carries an immense amount of sediment.

The San Pitch joins the Sevier near Gunnison below the gaging station on the main stream. Its flow is controlled by a storage reservoir about 15 miles above the mouth and is used for irrigating small tracts along the river. Manti Creek, its principal tributary, which enters above the reservoir, drains a barren area and has a rapid run-off.

Beaver River is nominally a part of the Sevier Lake drainage basin. This stream with its tributaries, North, South, and Indian creeks, rises on the western slope of the Tushar Mountains in the southwestern part of Utah, flows westward to Minersville, and thence northward until its waters are lost in the sands a few miles north of Milford. Only a small portion of the highest floods ever reaches Sevier Lake. The upper part of its drainage basin is rough and mountainous, some of the peaks rising to elevations of over 12,000 feet. In this part of the basin the flow is regulated both by snow and by the soil, which absorbs and holds back moisture. The lower part of the area consists of a high plateau, most of which is desert.

SEVIER RIVER NEAR MARYSVALE, UTAH.

This station, which is located about 6 miles above Marysvale, Utah, about 3 miles below the site of the proposed State dam on Sevier River, and about 10 miles below the junction of South and East forks, was established February 18, 1906, to determine the amount of water available for irrigation and storage in the upper valley of Sevier River.

The gage is a vertical staff; its datum has remained unchanged since the station was established.

Discharge measurements are made from a cable and car.

The relation between gage height and discharge is somewhat affected by ice during very cold weather, and also by the manipulation of gates at storage reservoirs on the South and East forks. The flow is not affected by artificial control below the station.

The bed of the stream is somewhat shifting, but the results may be considered good.

Discharge measurements of Sevier River near Marysvale, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 12	E. S. Fuller	60	276	5.70	889
19	do	56	220	4.70	620
Aug. 20	G. H. Canfield	52	133	3.25	303
Sept. 14	do	53	140	3.43	334
23	do	53	133	3.05	319
Oct. 20	do	53	115	2.98	254

Daily gage height, in feet, of Sevier River near Marysvale, Utah, for 1910.

[Martha Pitts, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	4.1	5.6	3.4	.....	3.8	3.5	2.75	3.35	.....
2	.....	.....	.....	4.15	5.7	3.4	.....	3.95	3.5	2.8	3.3	.....
3	.....	.....	.....	4.1	5.7	3.4	.....	3.9	3.55	2.8	3.0	.....
4	.....	.....	5.3	4.0	5.6	3.35	.....	3.6	3.75	2.75	2.9	.....
5	.....	.....	.....	3.85	5.6	3.2	.....	3.5	3.8	2.6	2.9	.....
6	.....	.....	.....	4.0	5.65	3.3	.....	3.4	3.85	2.6	2.8	.....
7	.....	.....	.....	4.0	5.65	3.3	.....	3.25	3.6	2.6	.....	.....
8	.....	.....	.....	4.0	5.6	2.4	.....	3.1	3.6	2.6	2.8	.....
9	.....	.....	.....	4.05	5.6	2.1	.....	3.1	3.5	2.5	2.8	.....
10	.....	.....	.....	4.05	5.6	2.25	.....	3.0	3.5	2.5	.....	.....
11	.....	.....	.....	.....	5.6	3.0	3.5	3.05	3.45	2.4	2.8	.....
12	.....	.....	.....	.....	5.6	3.2	3.5	3.2	3.4	2.4	2.8	2.6
13	.....	.....	4.8	.....	5.4	3.3	3.5	3.2	3.4	2.4	2.9	3.3
14	.....	.....	4.9	4.25	.....	3.55	3.5	3.5	3.4	2.4	2.9	3.3
15	.....	.....	5.0	4.25	4.7	3.8	3.5	3.45	3.5	2.4	2.9	3.3
16	.....	.....	5.0	.....	4.7	3.8	3.5	3.4	3.7	3.35	3.0	3.3
17	.....	2.3	5.1	.....	4.7	3.8	3.5	3.35	3.8	3.6	2.9	3.2
18	.....	.....	5.2	.....	4.7	3.8	3.5	3.2	4.0	3.3	2.9	3.2
19	2.5	.....	5.3	.....	4.7	3.8	3.45	3.25	3.95	3.0	.....	3.7
20	.....	.....	5.6	4.9	4.7	3.75	3.45	3.25	3.9	.....	.....	3.7
21	.....	.....	5.9	5.0	3.6	3.75	3.4	3.25	4.0	.....	2.8	3.6
22	.....	.....	6.0	5.1	3.55	3.8	3.35	3.25	3.8	.....	2.8	3.4
23	.....	.....	5.3	5.1	3.55	3.75	3.3	3.25	3.45	.....	2.8	.....
24	.....	.....	5.0	5.1	3.5	3.9	.....	3.3	3.2	.....	2.8	.....
25	2.1	.....	4.9	5.2	3.5	3.85	3.25	3.25	3.1	.....	2.7	.....
26	2.1	3.5	4.8	5.3	3.5	3.8	3.3	3.2	3.0	.....	2.75	2.8
27	.....	3.6	4.5	5.35	3.5	3.8	3.3	3.25	3.0	3.7	2.8	2.9
28	.....	.....	4.4	5.4	3.45	3.9	3.3	3.2	2.9	3.4	.....	2.9
29	.....	.....	4.2	5.5	3.45	3.85	3.4	3.7	2.8	3.4	.....	3.1
30	.....	.....	4.0	5.65	3.45	3.8	3.5	3.6	2.8	3.35	.....	3.1
31	.....	.....	4.0	.....	3.45	.....	3.55	3.5	.....	3.35	.....	2.7

NOTE.—Relation of gage height to discharge probably affected by ice during January and greater part of February. On Feb. 25 a sudden rise undoubtedly removed all ice, and gage heights were unaffected during the balance of the year. Water below gage Dec. 1 to 11.

Daily discharge, in second-feet, of Sevier River near Marysvale, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			500	478	860	331	407	412	351	212	322	50
2			600	489	890	331	401	445	351	220	312	50
3			700	478	890	331	395	434	361	220	256	50
4			777	456	860	322	389	371	402	212	238	50
5			763	423	860	293	383	351	412	190	238	50
6			749	456	875	312	377	331	423	190	220	50
7			735	456	875	312	371	302	371	190	220	50
8			720	456	860	170	366	274	371	190	220	50
9			705	467	860	137	361	274	351	175	220	50
10			690	467	860	176	356	256	351	175	226	50
11			675	478	860	257	351	266	341	160	220	50
12			660	489	860	293	351	293	331	160	220	190
13			645	500	804	312	351	293	331	160	238	312
14			671	512	712	361	351	351	331	160	238	312
15			697	512	620	412	351	341	351	160	238	312
16			697	543	620	412	351	331	391	322	256	312
17			723	575	620	412	351	322	412	371	238	293
18			750	607	620	412	351	293	456	312	238	293
19			777	639	620	412	341	302	445	256	232	391
20			860	671	620	402	341	302	434	273	226	391
21			950	697	371	402	331	302	456	290	220	371
22			980	723	361	412	322	302	412	307	220	331
23			777	723	361	402	312	302	341	324	220	300
24			697	723	351	434	307	312	293	342	220	275
25		250	671	750	351	423	302	302	274	360	205	250
26		351	645	777	351	412	312	293	256	378	212	220
27		371	570	790	351	412	312	302	256	391	220	238
28		375	546	804	341	434	312	293	238	331	220	238
29			500	832	341	423	331	391	220	331	220	274
30			456	875	341	412	351	371	220	322	220	274
31			456		341		361	351		322		205

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge interpolated for days on which gage was not read, except Mar. 1 to 3, for which it was estimated, and Dec. 1 to 11, for which period discharge was estimated at 50 second-feet.

Monthly discharge of Sevier River near Marysvale, Utah, for 1910.

[Drainage area, 2,560 miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			150	0.059	0.07	9,220	D.
February	375		185	.072	.08	10,300	D.
March	980	456	688	.269	.31	42,300	C.
April	875	423	595	.232	.26	35,400	B.
May	890	341	629	.246	.28	38,700	A.
June	434	137	352	.138	.15	20,900	A.
July	407	302	350	.137	.16	21,500	B.
August	445	266	325	.127	.15	20,000	A.
September	456	220	351	.137	.15	20,900	A.
October	391	160	258	.101	.12	15,900	A.
November	322	205	233	.091	.10	13,900	B.
December	391	50	203	.079	.09	12,500	C.
The year period	980	50	361	.141	1.92	262,000	

NOTE.—Mean discharge for January and for Feb. 1 to 24 determined by gage heights scattered through period and decreased to a small extent on account of ice obstruction. Mean discharge Feb. 1 to 24 estimated at 160 second-feet.

SEVIER RIVER NEAR GUNNISON, UTAH.

This station, which is located at the highway bridge on the road to Westview precinct, about 4 miles west of Gunnison, Utah, was established June 29, 1900.

It is about three-fourths of a mile above the mouth of San Pitch River and below all other important tributaries.

An inclined staff gage is located just below the bridge; its datum remained unchanged until September 24, 1910, when a new gage was established at a datum 1 foot higher than that of the old gage.

Discharge measurements are made from the bridge or by wading.

The relation between gage height and discharge is occasionally slightly affected by ice. The bed of the stream shifts somewhat during floods, but on the whole the records may be considered good.

Discharge measurements of Sevier River near Gunnison, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 21	G. H. Canfield	.....	50	1.48	70
Sept. 24	.....do	.....	138	3.68	390
24	.....do	79	137	3.68	404
Oct. 21	.....do	78	97	3.14	223
Dec. 13	.....do	79	104	3.22	258

NOTE.—Gage height of measurement Aug. 21 referred to old datum; add 1 foot to reduce to new datum. Gage heights of measurements Sept. 24 to Dec. 13 referred to new datum; subtract 1 foot to reduce to old datum.

Daily gage height, in feet, of Sevier River near Gunnison, Utah, for 1910.

[L. H. Lund, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.9	3.05	3.5	3.85	3.05	1.6	1.2	1.8	1.3	2.3	2.9	2.5
2	3.7	3.1	3.5	3.8	3.2	1.6	1.2	1.8	1.3	2.25	3.5	2.5
3	3.65	3.15	3.7	3.75	3.1	1.65	1.2	2.0	1.3	2.2	3.1	2.5
4	3.7	3.1	3.9	3.7	2.9	1.6	1.2	1.95	1.5	2.15	2.8	2.5
5	3.65	3.1	4.35	3.5	2.95	1.6	1.2	1.8	1.55	2.1	2.75	2.5
6	3.65	2.9	4.4	3.6	2.9	1.6	1.2	1.7	1.55	2.05	2.75	2.5
7	3.5	2.9	4.9	3.5	2.8	1.5	1.2	1.7	1.7	2.05	2.6	2.4
8	3.5	2.9	4.85	3.4	2.9	1.5	1.2	1.7	1.7	2.05	2.55	2.4
9	3.45	2.9	4.8	3.4	2.7	1.45	1.2	1.6	1.85	2.05	2.5	2.4
10	3.4	.....	4.7	3.35	2.8	1.4	1.2	1.7	1.85	2.15	2.5	2.35
11	3.4	2.95	4.7	3.2	2.9	1.4	1.2	1.6	1.9	2.15	2.5	2.2
12	.....	3.0	4.55	3.0	2.7	1.4	1.2	2.45	1.95	2.15	2.45	2.2
13	3.2	3.0	4.5	2.95	2.65	1.4	1.2	1.9	1.85	2.2	2.45	2.2
14	3.2	3.0	4.5	2.9	2.7	1.4	1.2	1.7	1.85	2.2	2.45	2.2
15	3.1	3.0	4.5	2.9	2.6	1.35	1.2	1.7	1.85	2.25	2.45	2.2
16	3.5	2.9	4.5	2.8	2.5	1.4	1.2	1.7	1.85	2.3	2.45	2.2
17	3.1	3.0	4.5	2.8	2.7	1.3	1.2	1.6	1.8	2.35	2.45	2.5
18	3.1	3.0	4.5	2.75	2.4	1.3	1.2	1.55	1.8	2.35	2.4	2.65
19	3.1	3.1	4.45	2.75	2.45	1.3	1.3	1.55	1.95	2.4	2.45	2.65
20	3.1	3.1	4.4	2.75	2.4	1.3	1.25	1.55	2.3	2.4	2.4	2.65
21	3.05	3.15	4.4	2.9	2.45	1.3	1.4	1.5	2.8	2.4	2.45	2.65
22	3.05	3.2	4.45	2.85	2.3	1.3	1.4	1.5	2.8	2.45	2.4	2.75
23	.....	3.2	4.5	2.7	2.3	1.3	1.4	1.45	2.7	2.45	2.4	2.8
24	3.05	3.2	4.5	2.75	2.05	1.3	1.4	1.45	2.7*	2.45	2.4	2.85
25	3.0	3.2	4.5	2.8	1.4	1.3	1.4	1.4	2.7	2.5	2.4	2.75
26	3.0	3.25	4.6	2.8	1.6	1.25	1.65	1.4	2.7	2.5	2.4	2.75
27	2.9	3.3	4.45	2.85	2.0	1.2	1.65	1.4	2.6	2.65	2.45	2.8
28	2.9	3.3	4.1	2.85	1.7	1.2	1.65	1.35	2.5	2.6	2.45	2.8
29	.....	.....	4.1	2.85	1.6	1.2	1.7	1.35	2.45	2.7	2.45	2.8
30	2.7	.....	4.0	2.9	1.6	1.2	1.7	1.35	2.35	2.7	2.5	2.8
31	3.0	.....	4.0	.....	1.6	.....	1.7	1.3	.....	2.7	.....	2.75

NOTE.—A new gage was established Sept. 24, 1910, at a different datum, and subsequent gage heights have been reduced to the old datum.

The relation of gage height to discharge was probably unaffected by ice during January and February. Ice present Dec. 22 to 31.

Daily discharge, in second-feet, of Sevier River near Gunnison, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	470	530	715	875	530	100	30	140	44	270	470	330
2	805	550	715	850	590	100	30	140	44	255	715	330
3	782	570	805	828	550	110	30	190	44	240	550	330
4	805	550	900	805	470	100	30	178	80	228	435	330
5	782	550	1,120	715	490	100	30	140	90	215	418	330
6	782	470	1,150	760	470	100	30	120	90	202	418	330
7	715	470	1,410	715	435	80	30	120	120	202	365	300
8	715	470	1,380	670	470	80	30	120	120	202	348	300
9	692	470	1,350	670	400	70	30	100	152	202	330	300
10	670	480	1,300	650	435	60	30	120	152	228	330	285
11	670	490	1,300	590	470	60	30	100	165	228	330	240
12	630	510	1,220	510	400	60	30	315	178	228	315	240
13	590	510	1,200	490	382	60	30	165	152	240	315	240
14	590	510	1,200	470	400	60	30	120	152	240	315	255
15	550	510	1,200	470	365	52	30	120	152	255	315	240
16	715	470	1,200	435	330	60	30	120	152	270	315	240
17	550	510	1,200	435	400	44	30	100	140	285	315	330
18	550	510	1,200	418	300	44	30	90	140	285	300	382
19	550	550	1,180	418	315	44	44	90	178	300	315	382
20	550	550	1,150	418	300	44	37	90	270	300	300	382
21	530	570	1,150	470	315	44	60	80	435	300	315	382
22	530	590	1,180	452	270	44	60	80	435	315	300	380
23	530	590	1,200	400	270	44	60	70	400	315	300	380
24	530	590	1,200	418	202	44	60	70	400	315	300	370
25	510	590	1,200	435	60	44	60	60	400	330	300	370
26	510	610	1,250	435	100	37	110	60	400	330	300	360
27	470	630	1,180	452	190	30	110	60	365	382	315	360
28	470	630	1,000	452	120	30	110	52	330	365	315	360
29	435	.....	1,000	452	100	30	120	52	315	400	315	350
30	400	.....	950	470	100	30	120	52	285	400	330	350
31	510	.....	950	.....	100	.....	120	44	.....	400	.....	350

NOTE.—Daily discharge determined from discharge rating curve fairly well defined. Discharge interpolated for days on which gage was not read. Discharge Dec. 22 to 31 estimated.

Monthly discharge of Sevier River near Gunnison, Utah, for 1910.

[Drainage area, 3,990 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	805	400	600	0.150	0.17	36,900	B.
February	630	470	537	.135	.14	29,800	B.
March	1,410	715	1,130	.283	.33	69,500	B.
April	875	400	554	.139	.16	33,000	B.
May	590	60	333	.083	.10	20,500	B.
June	110	30	60.2	.015	.02	3,580	B.
July	120	30	52	.013	.01	3,200	B.
August	315	44	108	.027	.03	6,640	A.
September	435	44	213	.053	.06	12,700	A.
October	400	202	282	.071	.08	17,300	A.
November	715	300	353	.088	.10	21,000	A.
December	382	240	326	.082	.09	20,000	B.
The year	1,410	30	379	.095	1.29	274,000	

BEAVER RIVER AT MINERSVILLE, UTAH.

This station, which is located about half a mile below the Beaver County bridge and about three-fourths of a mile northwest of Minersville, Utah, was established April 13, 1909.

The station is below all tributaries, Indian Creek, North Creek, and South Creek entering 10, 12, and 15 miles, respectively, above the station. The Minersville canal diverts all the normal low-water flow at a point about 2 miles above the station, at which the river is usually dry during several months in the summer.

Discharge measurements are made from a footbridge built for the purpose. An inclined staff gage is located just above the bridge. The gage datum has remained unchanged since the station was established.

The relation between gage height and discharge is not affected by ice nor by artificial control below. The section is fairly permanent, and the records may be considered good.

The following discharge measurement was made by G. C. Baldwin:

December 16, 1910: Width, 26 feet; area, 27 square feet; gage height, 2.25 feet; discharge, 34 second-feet.

Daily gage height, in feet, of Beaver Creek at Minersville, Utah, for 1910.

[Tus Gillins, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.0	2.4	2.4	2.3	2.6						2.05	2.3
2	4.7	2.4	2.4	2.3	2.5						2.05	2.3
3	2.9	2.4	2.5	2.3	2.5						2.05	2.3
4	2.6	2.45	2.5	2.3	2.2						2.15	2.3
5	2.6	2.4	2.5	2.2	2.15						2.15	2.3
6	2.6	2.4	2.45	2.2	2.0						2.15	2.3
7	2.9	2.45	2.45	2.3	1.6						2.15	2.3
8	2.85	2.4	2.5	2.2	1.0						2.15	2.3
9	3.1	2.45	2.5	2.2	0.6						2.15	2.3
10	3.1	2.25	2.6	2.2							2.15	2.3
11	2.8	2.2	2.5	2.1	0.9						2.15	2.3
12	2.55	2.2	2.8	2.2	1.4						2.15	2.3
13	2.5	2.2	2.65	2.45	1.5						2.2	2.3
14	2.6	2.2	2.65	2.4	1.3				2.2		2.2	2.3
15	2.6	2.3	1.45	2.3	0.6				1.1		2.2	2.3
16	3.0	2.2	2.15	2.3							2.2	2.3
17	3.15	2.3	1.0	2.3						1.75	2.2	2.3
18	2.6	2.25	1.4	2.2						1.55	2.2	2.3
19	2.6	2.2	1.25	2.2					1.9	1.55	2.2	2.3
20	2.5	2.2	2.45	2.2						1.55	2.2	2.3
21	2.5	2.25	2.6	2.2						1.85	2.2	2.3
22	2.5	2.25	2.7	2.2						1.85	2.2	2.3
23	2.7	2.35	2.8	2.25						1.85	2.2	2.3
24	2.65	2.3	2.7	2.4						2.05	2.2	2.3
25	2.7	2.3	2.75	2.5						2.05	2.2	2.3
26	2.6	2.35	2.8	2.6						2.05	2.2	2.3
27	2.4	2.4	2.65	2.6						2.15	2.3	2.3
28	2.4	2.35	2.85	2.7						2.15	2.3	2.3
29	2.4		2.55	2.9						2.15	2.3	2.3
30	2.4		2.4	2.7						2.05	2.3	2.3
31	2.4		2.35							2.05		2.3

NOTE.—Channel dry May 16 to Oct. 16, with the exception of Sept. 14, 15, and 19.

Daily discharge, in second-feet, of Beaver Creek at Minersville, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	358	47	47	38	68						20	38
2	608	47	47	38	57						20	38
3	107	47	57	38	57						20	38
4	68	52	57	38	30						26	38
5	68	47	57	30	26						26	38
6	68	47	52	30	17						26	38
7	107	52	52	38							26	38
8	100	47	57	30							26	38
9	138	52	57	30							26	38
10	138	34	68	30							26	38
11	93	30	57	23							26	38
12	62	30	93	30							26	38
13	57	30	74	52							30	38
14	68	30	74	47					30		30	38
15	68	38	0	38					0		30	38
16	122	30	26	38							30	38
17	146	38	0	38						4.0	30	38
18	68	34	0	30						.0	30	38
19	68	30	0	30					11	.0	30	38
20	57	30	52	30						.0	30	38
21	57	34	68	30						8.5	30	38
22	57	34	80	30						8.5	30	38
23	80	42	93	34						8.5	30	38
24	74	38	80	47						20	30	38
25	80	38	86	57						20	30	38
26	68	42	93	68						20	30	38
27	47	47	74	68						26	38	38
28	47	42	100	80						26	38	38
29	47		62	107						26	38	38
30	47		47	80						20	38	38
31	47		42							20		38

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined. No discharge May 16 to Oct. 16, except on Sept. 14, 15, and 19.

Monthly discharge of Beaver Creek at Minersville, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	608	47	104	6,400	B.
February	52	30	39.6	2,200	A.
March	100	0	56.5	3,470	A.
April	107	23	43.2	2,570	A.
May	68	0	8.2	504	D.
June			.0		
July			.0		
August			.0		
September	30	0	1.4	82	D.
October	26	0	6.7	412	D.
November	38	20	28.8	1,710	B.
December	38	38	38.0	2,340	B.
The year	608	0	27.2	19,700	

THOUSAND SPRINGS CREEK BASIN.

THOUSAND SPRINGS CREEK NEAR TECOMA, NEV.

Thousand Springs Creek rises in the northeastern part of Elko County, Nev., in a range of mountains trending northeast to southwest, flows northeastward to its junction with Rock Springs Creek,

then turns abruptly and flows southeastward approximately 25 miles, sinking into the sand west of Tecoma.

The main source of water supply for the creek is the snow that falls on the mountainous upper part of the drainage area. Occasionally a thaw during the winter or early spring causes flood stages in the creek, but the snow melts gradually, the dry soil absorbs the water, and little reaches the creek channel over the surface.

At the confluence of Thousand Springs Creek and Rock Springs Creek is a reservoir site which could be used to store water to irrigate some very good land.

The gaging station, which is located below the entrance of the canyon, three-fourths mile below the mouth of Rock Springs Creek, in the northwest corner of sec. 31, T. 42 N., R. 68 E., was established November 1, 1910.

Some of the spring flow is used for irrigation above the station, but most of the water returns to the creek.

An inclined staff gage fastened on the left bank was used until November 20, 1911, when a Friez automatic gage was installed at the same point.

Discharge measurements are made from a cable and car just below the gage; low-stage measurements are made by wading.

The relation between gage height and discharge is not affected by artificial control, but the water in the creek freezes during the winter, sometimes even to the stream bed.

The section is fairly permanent. No high-water measurements have yet been made.

The following discharge measurement was made by G. H. Canfield:

November 1, 1910: Width, 3.5 feet; area, 0.63 square feet, gage height, 0.90 feet; discharge, 0.52 second-feet.

Daily gage height, in feet, of Thousand Springs Creek near Tecoma, Nev., for 1910.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		0.9	11	0.8		21	0.7	
2			12		0.95	22		
3			13			23		0.7
4			14	.85		24		
5			15			25	.85	
6		.7	16		.7	26		.7
7		.6	17			27		
8			18	.8		28	.8	
9			19			29		
10		.95	20		.7	30		.6
						31		

SALTON SINK.

SALTON SEA NEAR SALTON, CAL.

Salton Sink originally formed a part of the Colorado Desert, which extends northwestward almost 100 miles from the California-Mexico boundary line and comprises an area of nearly 2,000 square miles.

This desert comprises two fertile valleys, one to the northwest of the sink, in Riverside County, known as the Coachella Valley, and the other to the southeast of the sink, in Imperial County, called the Imperial Valley. Salton Sea, which now partly fills the sink, lies between the two valleys, being partly in Riverside County and partly in Imperial County. It is about 160 miles southeast of Los Angeles, 90 miles northwest of Yuma, and 50 miles north of Calexico. The longer diameter of the sea trends northwest and southeast. On December 31, 1908, its surface was 206 feet below mean sea level, its length was nearly 45 miles, its maximum width about 15 miles, its minimum width 9.5 miles, its maximum depth 67.5 feet, and its superficial area about 443 square miles.

During the high water of the summer of 1891 the Colorado overflowed into Salton Sink to such an extent as to endanger the Southern Pacific Railroad at its lowest point. In the summer of 1905, after a succession of winter and spring floods in Gila River followed by an exceptionally heavy summer flow in the Colorado, the flood into the sink was repeated on a much larger scale. The old river channel occupied by Alamo River was transformed into a deep, wide gorge, and another channel, now called New River, was formed. The flood did great damage to the tracks of the Southern Pacific Railroad, to the plant of the New Liverpool Salt Co. below Mecca, and to the ranches in the vicinity.

Gage-height records kept by the New Liverpool Salt Co. from November, 1904, to February 26, 1906, show the actual depth of the water above the lowest portion of the sink. February 23, 1906, the Government installed a gage at the same datum, about half a mile west of Salton railroad station and 3 miles southeast of the old Salton station. This gage was destroyed by waves. The Southern Pacific Co. had graduated a trestle bent across Salt Creek about 2½ miles east of Salton, using the company's datum; the zero of this gage is 273.5 feet below mean sea level as determined from United States Geological Survey bench marks, or at an elevation of 280.3 feet below sea level according to the Southern Pacific Co.

Practically all the water received by Salton Sea enters through Alamo and New rivers, but chiefly through the former. These rivers run through Imperial Valley and are the drainage channels for the excess and waste water from the irrigation system and from the power plants.

The values in the following table have been reduced from the observed gage heights to show the depth of the Salton Sea above the zero of the gage.

Daily depth, in feet, of Salton Sea near Salton, Cal., for 1910.

[Benjamin C. Kadel, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	63.4	63.4	63.2	62.95	62.65	62.15	61.5	61.05	60.4	59.7	59.15	58.85
2	63.4	63.4	63.2	62.95	62.65	62.15	61.5	61.05	60.4	59.65	59.15	58.8
3	63.4	63.4	63.2	62.95	62.65	62.1	61.45	61.05	60.35	59.65	59.15	58.8
4	63.45	63.35	63.2	62.95	62.6	62.1	61.45	61.0	60.3	59.6	59.1	58.8
5	63.4	63.35	63.2	62.9	62.55	62.1	61.45	61.0	60.25	59.6	59.1	58.8
6	63.4	63.3	63.2	62.95	62.55	62.1	61.4	60.95	60.2	59.6	59.1	58.75
7	63.4	63.3	63.2	62.85	62.5	62.05	61.4	60.95	60.15	59.55	59.1	58.75
8	63.4	63.3	63.2	62.9	62.5	62.05	61.35	60.9	60.05	59.55	59.05	58.75
9	63.4	63.3	63.15	62.9	62.55	62.05	61.35	60.85	60.0	59.5	59.05	58.7
10	63.4	63.3	63.15	62.9	62.5	62.05	61.35	60.85	59.95	59.5	59.05	58.7
11	63.4	63.3	63.15	62.85	62.45	62.0	61.35	60.8	59.9	59.5	59.0	58.7
12	63.4	63.3	63.1	62.8	62.45	61.95	61.3	60.85	59.9	59.45	59.0	58.7
13	63.4	63.3	63.15	62.85	62.45	61.95	61.3	60.8	59.9	59.45	59.0	58.7
14	63.4	63.3	63.1	62.85	62.45	61.9	61.25	60.7	59.85	59.45	59.0	58.7
15	63.4	63.3	63.15	62.85	62.4	61.8	61.25	60.7	59.85	59.4	59.0	58.65
16	63.4	63.25	63.1	62.8	62.35	61.75	61.25	60.7	59.8	59.4	59.0	58.65
17	63.4	63.25	63.1	62.8	62.35	61.75	61.25	60.65	59.8	59.35	59.0	58.65
18	63.4	63.25	63.1	62.8	62.35	61.75	61.2	60.6	59.8	59.35	59.0	58.65
19	63.4	63.25	63.1	62.8	62.35	61.75	61.25	60.55	59.8	59.3	58.95	58.65
20	63.4	63.25	63.1	62.8	62.35	61.75	61.25	60.55	59.8	59.3	58.95	58.65
21	63.4	63.25	63.1	62.8	62.25	61.75	61.25	60.55	59.75	59.3	58.95	58.6
22	63.4	63.25	63.1	62.75	62.25	61.7	61.2	60.5	59.75	59.25	58.95	58.6
23	63.4	63.25	63.1	62.75	62.25	61.65	61.25	60.5	59.75	59.25	58.95	58.6
24	63.4	63.15	63.1	62.75	62.25	61.6	61.2	60.5	59.75	59.25	58.9	58.55
25	63.4	63.15	63.1	62.75	62.25	61.65	61.15	60.45	59.75	59.25	58.9	58.55
26	63.4	63.2	63.05	62.75	62.25	61.55	61.15	60.45	59.75	59.2	58.9	58.55
27	63.4	63.25	63.05	62.7	62.25	61.55	61.15	60.45	59.75	59.2	58.9	58.5
28	63.4	63.2	63.05	62.7	62.2	61.55	61.1	60.45	59.7	59.2	58.9	58.5
29	63.4	.....	63.05	62.7	62.2	61.55	61.1	60.4	59.7	59.2	58.85	58.5
30	63.4	.....	62.95	62.65	62.2	61.5	61.05	60.4	59.7	59.2	58.85	58.45
31	63.4	.....	62.95	.....	62.15	.....	61.05	60.4	.....	59.15	.....	58.45

Monthly rise of Salton Sea near Salton, Cal., for 1904–1910.

Month.	Monthly rise.	Total rise.	Month.	Monthly rise.	Total rise.	Month.	Monthly rise.	Total rise.
1904.	*Feet.*	*Feet.*	1907.	*Feet.*	*Feet.*	1909.	*Feet.*	*Feet.*
November	0.6	.....	January	2.8	75.3	January	0.0	67.4
December	.2	0.8	February	.7	76.0	February	— .15	67.25
1905.			March	— .1	75.9	March	— .25	67.0
January	1.4	2.2	April	— .3	75.6	April	— .3	66.7
February	1.6	3.8	May	— .5	75.1	May	— .4	66.3
March	.8	4.6	June	— .4	74.7	June	— .4	65.9
April	1.2	5.8	July	— .2	74.5	July	— .6	65.3
May	1.0	6.8	August	— .3	74.2	August	— .05	65.25
June	2.2	9.0	September	— .7	73.5	September	— .5	64.75
July	4.4	13.4	October	— .4	73.1	October	— .55	64.2
August	2.2	15.6	November	— .5	72.6	November	— .55	63.65
September	1.2	16.8	December	— .3	72.3	December	— .25	63.4
October	1.4	18.2	1908.			1910.		
November	1.6	19.8	January	.0	72.3	January	.0	63.4
December	2.9	22.7	February	— .1	72.2	February	— .2	63.2
1906.			March	— .2	72.0	March	— .25	62.95
January	1.1	23.8	April	— .4	71.6	April	— .3	62.65
February	1.8	25.6	May	— .6	71.0	May	— .5	62.15
March	2.7	28.3	June	— .5	70.5	June	— .65	61.5
April	5.6	33.9	July	— .5	70.0	July	— .45	61.05
May	8.6	42.5	August	— .6	69.4	August	— .65	60.4
June	15.4	57.9	September	— .8	68.6	September	— .7	59.7
July	8.6	66.5	October	— .7	67.9	October	— .55	59.15
August	2.9	69.4	November	— .3	67.6	November	— .3	58.85
September	.9	70.3	December	— .2	67.4	December	— .4	58.45
October	1.2	71.5						
November	— .2	71.3						
December	1.2	72.5						

ALAMO RIVER NEAR BRAWLEY, CAL.

During 1908 discharge measurements were made on Alamo River at a highway bridge 3½ miles east of Brawley, Cal., in sec. 31, T. 13 S., R. 15 E., by H. R. Edwards, engineer for the New Liverpool Salt Co.[1] During 1909 measurements were made by engineers of the United States Geological Survey. On June 24, 1909, a continuous record of gage heights was commenced at this point. The staff gage is spiked vertically to a pile in the left abutment of the bridge. The datum of the gage has remained the same during the maintenance of the station. All discharge measurements prior to May 3, 1910, were made from the bridge. Beginning May 3, 1912, discharge measurements were made from a car and cable 100 feet below the bridge.

The data obtained at this station, together with those obtained on New River, show the amount of waste water reaching Salton Sea and are of value in connection with experiments being made by the United States Weather Bureau for determining the evaporation from Salton Sea.

Conditions for obtaining accurate discharge data are poor. The channel is constantly scouring or filling as the stage fluctuates. Both banks are high and well above overflow.

This station is maintained in cooperation with P. L. Sherman, jr., of Los Angeles, Cal.

Discharge measurements of Alamo River near Brawley, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 9	A. H. Koebig, jr	68	256	7.10	1,030
Feb. 5	W. B. Clapp	46	67	4.00	98
May 3[a]	G. C. Noble	34	50	4.30	95
Sept. 16[a]	N. T. Shaw	40	132	5.80	395
Oct. 16[a]	P. L. Sherman, jr	43	134	5.80	436
Dec. 18[a]	....do	30	103	5.30	288

[a] Measurement made from cable.

[1] These measurements were published in Water-Supply Paper U. S. Geol. Survey No. 249, p. 52, and No. 251, p. 46.

Daily gage height, in feet, of Alamo River near Brawley, Cal., for 1910.

[Mrs. Flora Helman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.9	4.35	3.25	3.85	4.45	4.1	4.3	.....	4.15	5.1	6.0	5.2
2	4.9	4.5	3.2	3.8	4.5	4.25	4.15	.....	4.15	5.0	6.0	5.1
3	4.75	4.4	3.2	3.9	4.4	4.2	4.05	.....	3.85	5.15	6.1	5.2
4	6.55	4.35	3.2	3.95	4.35	4.05	4.2	.....	3.9	5.65	6.3	5.2
5	6.9	3.95	3.2	3.8	4.0	4.0	4.35	.....	4.25	5.55	6.6	5.1
6	7.0	3.75	3.2	3.7	3.9	4.2	4.2	.....	4.35	5.4	6.1	5.4
7	7.25	3.7	3.25	3.65	4.25	3.9	4.1	.....	4.85	5.1	6.5	5.1
8	7.1	4.25	3.4	3.75	4.5	3.8	4.3	.....	4.75	5.45	6.6	4.9
9	7.05	3.8	3.25	3.7	4.4	3.95	4.2	.....	4.5	5.8	6.0	4.8
10	6.55	3.6	3.25	3.9	4.25	3.8	4.15	.....	3.95	5.65	6.2	5.1
11	6.4	3.5	3.3	4.1	4.25	4.0	4.1	.....	4.6	5.6	6.3	5.0
12	6.45	3.5	3.4	3.9	4.1	4.25	3.95	.....	4.65	5.6	6.2	4.9
13	5.9	3.4	3.5	3.9	4.15	4.0	3.95	.....	5.05	6.15	6.2	5.0
14	5.25	3.45	3.35	3.7	4.0	4.05	4.05	.....	5.3	6.55	7.0	4.8
15	5.15	3.35	3.25	3.85	4.3	3.8	3.95	.....	5.65	5.65	7.0	5.2
16	4.75	3.4	3.3	3.95	4.4	3.8	4.0	.....	5.9	5.7	7.0	5.2
17	4.45	3.4	3.35	3.85	4.25	3.85	4.0	.....	5.75	6.0	7.0	5.5
18	4.35	3.4	3.4	4.0	4.1	3.75	3.8	.....	6.15	6.05	6.6	5.2
19	4.25	3.4	3.45	3.75	4.15	4.0	3.85	.....	5.75	6.2	6.3	5.1
20	4.4	3.35	3.4	4.05	4.15	4.05	3.85	.....	5.55	6.5	6.4	5.5
21	4.55	3.3	3.35	3.8	4.0	3.9	3.9	.....	5.9	6.1	5.8	5.1
22	4.65	3.3	3.4	4.0	4.1	3.85	3.95	.....	5.8	5.8	5.4	5.3
23	4.95	3.3	3.45	3.8	4.25	3.85	3.9	.....	5.55	6.0	4.9	5.5
24	4.85	3.3	3.6	3.85	4.25	4.0	3.8	.....	5.25	6.1	4.8	5.4
25	4.95	3.3	3.5	4.0	4.0	4.3	3.7	4.3	5.2	5.9	5.2	5.5
26	4.8	3.3	3.55	4.0	4.1	4.3	3.65	.....	5.2	5.9	5.3	5.4
27	4.45	3.2	3.8	3.85	4.0	4.55	3.35	.....	5.1	5.5	5.3	5.5
28	4.45	3.25	3.65	3.85	4.2	4.7	3.3	3.85	5.4	5.3	5.0	5.4
29	4.45	.....	3.8	4.0	4.3	4.85	.....	4.15	5.2	5.0	5.2	5.5
30	4.5	.....	3.85	4.35	4.35	4.2	.....	3.95	5.15	5.7	5.1	5.2
31	4.45	.....	3.8	.....	4.0	.....	.....	4.0	.....	6.1	.....	5.4

NOTE.—From July 29 to August 24 the water level was below gage. On August 18 the observer stated that the gage height was about 3.5 feet.

Daily discharge, in second-feet, of Alamo River near Brawley, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	192	117	38	74	128	93	112	.....	98	230	484	252
2	192	134	36	71	134	107	98	.....	98	210	484	230
3	168	122	36	78	122	102	89	.....	74	241	521	252
4	716	117	36	82	117	89	102	.....	78	370	604	252
5	910	82	36	71	85	85	117	.....	107	341	740	230
6	972	68	36	64	78	102	102	.....	117	301	521	301
7	1,150	64	38	61	107	78	93	.....	184	230	691	230
8	1,040	107	46	68	134	71	112	.....	168	314	740	192
9	1,000	71	38	64	122	82	102	.....	134	417	484	175
10	716	58	38	78	107	71	98	.....	82	370	561	230
11	647	52	41	93	107	85	93	.....	146	355	604	210
12	669	52	46	78	93	107	82	.....	153	355	561	192
13	450	46	52	78	98	85	82	.....	220	541	561	210
14	264	49	44	64	85	89	89	.....	276	716	972	175
15	241	44	38	74	112	71	82	.....	370	370	972	252
16	168	46	41	82	122	71	85	.....	450	385	972	252
17	128	46	44	74	107	74	85	.....	401	484	972	327
18	117	46	46	85	93	68	71	.....	541	502	740	252
19	107	46	49	68	98	85	74	.....	401	561	604	230
20	122	44	46	89	98	89	74	.....	341	691	647	327
21	140	41	44	71	85	78	78	.....	450	521	417	230
22	153	41	46	85	93	74	82	.....	417	417	301	276
23	201	41	49	71	107	74	78	.....	341	484	192	327
24	184	41	58	74	107	85	71	.....	264	521	175	301
25	201	41	52	85	85	112	64	112	252	450	252	327
26	175	41	55	85	93	112	61	.....	252	450	276	301
27	128	36	71	74	85	140	44	.....	230	327	276	327
28	128	38	61	74	102	160	41	74	301	276	210	301
29	128	.....	71	85	112	184	.....	98	252	210	252	327
30	134	.....	74	117	117	102	.....	82	241	385	230	252
31	128	.....	71	.....	85	.....	.....	85	.....	521	.....	301

Monthly discharge of Alamo River near Brawley, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	1,150	107	376	23,100	B.
February	134	36	61.8	3,430	C.
March	74	36	47.6	2,930	C.
April	117	61	77.2	4,590	C.
May	134	78	104	6,400	B.
June	184	68	94.2	5,610	B.
July	117	.....	80.1	4,930	C.
August	.....	.....	63.5	3,900	D.
September	541	74	248	14,800	B.
October	716	210	405	24,900	B.
November	972	175	534	31,800	B.
December	327	175	259	15,900	B.
The period	1,150	.....	197	143,000	

NOTE.—Discharge estimated July 29 to August 24 and August 26 to 27, to complete the annual discharge.

NEW RIVER NEAR BRAWLEY, CAL.

During 1908 discharge measurements were made at a wagon bridge over New River, 1½ miles west of Brawley, Cal., and in sec. 31, T. 13 S., R. 14 E., by H. R. Edwards, engineer for the New Liverpool Salt Co. During 1909 measurements were made by engineers of the United States Geological Survey. On June 24, 1909, a continuous record of gage heights was begun at this point. The staff gage is spiked vertically to the third bridge pile from the right bank. The datum of the gage has remained the same during the maintenance of the station. At high stages discharge measurements are made from the bridge, but at medium and low stages measurements. During the later part of August, 1909, heavy rains in Imperial Valley caused a rise of New River which washed out the earth approaches to the bridge where measurements are made and completely changed the channel. Sufficient measurements have not since been made to define a rating curve, and no estimates of flow have therefore been made.

This station is maintained in cooperation with P. L. Sherman, jr., of Los Angeles, Cal.

The data obtained at this station, together with those obtained on Alamo River, show the amount of waste water reaching Salton Sea and are of value in connection with experiments being made by the United States Weather Bureau to determine the evaporation from Salton Sea.

The following discharge measurement was made by wading 100 feet above gage, by W. B. Clapp:

February 4, 1910: Width, 34 feet; area, 32 square feet; gage height, 4.80 feet; discharge, 40 second-feet.

Daily gage height, in feet, of New River near Brawley, Cal., for 1910.

[Herschell Darnell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.1	4.7	4.65	4.75	5.3	5.2	5.3	4.8	4.9	5.25	5.2	5.5
2	5.0	4.7	4.75	4.8	5.1	5.1	5.3	4.8	4.9	5.35	5.1	5.4
3	5.0	4.7	4.7	5.4	5.1	5.0	5.3	4.7	5.0	5.4	5.0	5.8
4	5.0	4.75	4.7	5.5	5.3	5.3	5.45	4.7	4.9	5.4	5.3	5.6
5	4.9	4.75	4.7	5.0	5.35	5.25	5.35	4.7	4.8	5.3	5.3	5.7
6	4.8	4.65	4.7	5.1	5.65	5.0	5.2	4.8	4.8	5.3	5.3	5.7
7	4.9	4.75	4.7	4.9	5.9	5.15	5.35	4.8	4.8	5.3	5.3	5.7
8	4.9	4.8	4.7	4.8	5.9	5.25	5.2	4.7	4.8	5.2	5.3	5.5
9	4.9	4.8	4.7	4.8	5.7	5.35	5.3	4.7	4.8	5.2	5.2	5.4
10	4.8	4.8	4.7	4.7	5.3	5.45	5.15	4.7	5.05	5.2	5.3	5.3
11	4.95	4.8	4.75	4.7	5.35	5.45	4.8	4.7	5.4	5.0	5.3	5.3
12	4.95	4.7	4.7	4.7	5.3	5.4	4.8	4.7	5.5	4.9	5.3	5.2
13	4.9	4.8	4.7	4.8	5.4	5.4	4.8	4.7	5.55	4.9	5.3	5.2
14	4.9	4.75	4.7	4.85	5.8	5.3	4.8	4.7	5.65	4.9	5.4	5.2
15	4.9	4.7	4.7	4.7	5.9	5.3	4.8	4.7	5.55	5.0	5.3	5.2
16	4.9	4.6	4.7	4.8	5.45	5.5	4.9	4.7	5.45	4.9	5.3	5.3
17	4.9	4.6	4.8	4.7	5.3	5.85	4.9	4.7	5.4	4.9	5.5	5.3
18	4.8	4.7	4.8	4.8	5.1	6.0	4.9	4.7	5.4	4.8	5.5	5.4
19	4.85	4.7	4.7	4.85	4.8	5.85	4.9	4.7	5.4	4.9	5.5	5.6
20	4.85	4.7	4.8	5.0	4.7	5.65	4.9	4.7	5.4	4.9	5.6	5.4
21	4.8	4.75	4.75	5.0	4.7	5.45	4.9	4.75	5.4	4.9	5.5	5.3
22	4.9	4.8	4.8	5.4	4.8	5.25	4.8	4.8	5.4	4.9	5.5	5.2
23	4.9	4.7	4.7	4.9	5.0	5.35	4.7	4.8	5.4	4.9	5.6	5.2
24	4.9	4.65	4.8	4.7	5.2	5.25	4.7	4.8	5.25	4.9	5.6	5.3
25	4.8	4.7	4.8	4.7	5.5	5.4	4.7	4.8	5.25	4.9	5.6	5.3
26	4.8	4.7	4.8	4.9	5.5	5.3	4.7	4.8	5.3	4.9	5.5	5.4
27	4.8	4.7	4.8	5.0	5.35	5.2	4.7	4.7	5.3	4.9	5.5	5.4
28	4.8	4.7	4.8	4.95	5.2	5.15	4.8	4.8	5.3	4.9	5.4	5.5
29	4.7	.....	4.8	5.3	5.35	5.1	4.7	4.9	5.3	5.0	5.4	5.6
30	4.8	.....	4.85	5.3	5.25	5.3	4.7	4.8	5.3	5.1	5.4	5.5
31	4.7	.....	4.75	.....	5.3	.....	4.8	4.8	.....	5.2	.....	5.5

OWENS LAKE BASIN.

GENERAL FEATURES.

Owens Lake is a saline body of water in the central part of Inyo County; its area comprises about 75 square miles. Like Mono Lake, which lies 125 miles farther north and about 3,000 feet higher, it derives its water from the vicinity of Mount Lyell.

The lake is fed by Owens River, which rises among the high peaks of the Sierra east of Mount Lyell and directly opposite the headwaters of the San Joaquin, at an altitude of nearly 12,000 feet above sea level. It flows eastward into Long Valley, thence southeastward through Owens River canyon into Owens Valley, thence eastward and southward through the trough of the valley to Owens Lake, about 20 miles southeast of Mount Whitney. The total length of the river is about 125 miles—45 miles above the lower end of the canyon and 80 miles in Owens Valley.

The basin is long and comparatively narrow and its topography is varied. It comprises a rough east-side mountain slope 5 or 6 miles wide, a valley floor about 6 miles wide, and a west-side slope ranging from 6 to 10 miles or more in width. The west-side area is made up of a very rugged and precipitous mountain slope 4 or 5 miles wide,

and a sloping alluvial plain composed of delta-fan surfaces ranging from 1 to 5 miles in width and lying at the foot of the mountains and west of the western margin of the valley. Owens Valley is smooth and ranges in altitude from 3,600 feet at the south end to about 4,100 feet at the north end. The crest of the east-side range of mountains averages about 6,000 feet higher than the valley floor. The west-side plain consists of a porous granitic alluvium of considerable depth, and ranges in altitude from about 4,000 feet at the western valley margin to about 6,000 feet at the foot of the mountains. It has a fairly uniform slope of 400 to 600 feet to the mile. The eastern slope of the Sierra is very steep and rugged, and ranges in altitude from about 6,000 feet at the foot to 13,000 or 14,000 feet at the crest. The geologic formation is granitic.

The basin is rather poorly forested. The eastern slope is practically barren of vegetation, except in places a scanty desert growth. The western slope has a very slight soil covering and only a sparse timber growth, found chiefly along the watercourses. All the western slope, a large part of the eastern slope, and the central part of Owens Valley are included in national forests.

The only precipitation records available indicate that the mean annual precipitation in the valley is about 5 inches. On the Sierra slope precipitation probably increases northward, and certainly increases with increase in altitude. On the higher slopes it may be 40 inches or more and occurs almost entirely as snow.

Owens River has many tributaries. More than 40 lateral streams, many of them, however, comparatively small, drain a part of the eastern slope of the Sierra and enter the main stream from the west. The principal tributaries, from north to south, are as follows: Rock, Pine, Horton, McGee, Birch, and Bishop creeks, opposite the San Joaquin basin; Coyote, Baker, Big Pine, Birch, Tinemaha, Taboose, Goodale, Division, Sawmill (Eightmile), Thibaut, Oak, Pine, and Symmes creeks, opposite Kings River basin; and Shepard, Bairs (Moffett), George, Hogback, Lone Pine, Tuttle, Richter, Cottonwood, and Ash creeks, opposite Kern River basin. No drainage enters Owens River from the east except during the rare, exceptionally heavy rainstorms.

Nearly all the streams rise in glacial lakelets and marshes which lie near the crest of the Sierra and serve to a certain extent as storage reservoirs in regulating the flow.

The streams emerge from the mouths of their canyons upon the porous alluvial plain at the base of the Sierra, which is 1 to 5 miles in width and several hundred feet deep, and across which they flow to the Owens River channel in the trough of the valley. This belt of débris is the source of a large and important loss, part of which appears in numerous springs throughout the valley. Perhaps stronger

evidence of the great loss by seepage is afforded by the broad belt of wet and somewhat boggy land which extends over a large part of the trough of the basin. Undoubtedly large quantities of water can be obtained by sinking wells within this area. Several artesian wells which have been sunk in the vicinity of Independence yield a strong flow and give convincing evidence of an artesian belt in the valley. With a view to the greatest ultimate utilization of the valley's water supply, the city of Los Angeles is conducting special investigations to determine the depth to and fluctuations in the ground-water plane and the rate of evaporation from free water surface and saturated gravels near Independence;[1] also to determine the amount of precipitation on the alluvial plain at the base of the Sierra between the 4,000 and 6,000 foot contours and the seepage losses of creeks crossing it.

Owens Valley is extensively cultivated and particularly adapted to stock raising. Numerous diversions are made for irrigation at different points on Owens River and tributaries, particularly in the upper part of the valley. Considerable water is also used for irrigating meadow lands in Long Valley north of Owens River canyon, but it is returned to the river above the head of Owens Valley.

The basin affords many opportunities for power development. The fall is so great and the minimum flow of the stream is so large and so reliably constant that many thousands of horsepower could be developed. It is estimated that a minimum of more than 100,000 horsepower could be obtained without storage, and this amount could be considerably more than doubled by utilizing all the possible storage. The Los Angeles Aqueduct, when completed, will have a capacity of 400 second-feet and a total fall of more than 3,000 feet from its intake in Owens Valley to its outfall in San Fernando Valley near the city, and will generate more than 100,000 horsepower. A full development of all the power opportunities in Owens River basin would probably yield more than 300,000 horsepower continuously.

The longest run-off record in Owens River basin extends back to 1903, when stations were established on the main stream and on Rock and Pine creeks near Round Valley, and Bishop Creek near Bishop. The wettest year since that time was 1906 or 1907, and the driest 1905. The total flow during the wettest year was nearly double that during the driest.

In the fall of 1903 stations were established on five or six of the principal streams in Owens Valley and on numerous diversion canals used for irrigation. After the city of Los Angeles had acquired its extensive holdings in the valley and had taken active steps to utilize the flow of Owens River and tributaries for a municipal water supply, many other stations were established at the request of and in coopera-

[1] See Water-Supply Paper U. S. Geol. Survey No. 294, 1912.

tion with the city. Since that time all stations in Owens Valley have been maintained in cooperation with the city of Los Angeles, the city paying all field and maintenance expenses and the National Government furnishing and paying an engineer to do the work.

All stations in Owens Valley except those on Owens River are located near the western margin of the valley, and most of them are below the delta fans which extend eastward from the mouths of the canyons and are above all diversions. Almost without exception measurements are made from footbridges or by wading. The current is swift at almost every station, and the channel is subject to more or less change.

OWENS RIVER NEAR ROUND VALLEY, CAL.

This station, which is located 600 feet above the junction of Owens River and Rock Creek, in sec. 10, T. 6 S., R. 31 E., Mount Diablo base and meridian, was established August 3, 1903, at a footbridge 100 feet above the present site, to which it was removed May 27, 1907, as the original station had been destroyed on March 19 of that year.

No important streams enter above and Rock Creek is the first tributary below the station. No ditches take water above the gage, but several divert from the main river and its tributaries below the station, the first one being the Owens River canal, which heads 3 miles below the mouth of Rock Creek. The drainage area above the station is approximately 450 square miles.

The gage, which is a vertical staff on the left bank, was not referred to the datum of the original gage.

Discharge measurements are made from a car and cable at the gage.

The channel is composed of rock and lava bowlders and changes little.

Discharge measurements of Owens River near Round Valley, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 9	R. E. Haines	34	86	2.56	352
30	do	34	73	2.12	218
Apr. 21	do	34	73	2.20	242
May 11	do	35	81	2.40	300
June 24	C. H. Lee	35	88	2.53	348
July 11	do	35	87	2.43	312
Aug. 2	do	35	83	2.32	288
24	F. G. Wood	34	71	2.07	201
Sept. 17	G. T. Peekema	34	69	2.02	175
Oct. 22	do	34	72	2.02	183
Nov. 18	do	34	71	2.03	189
Dec. 21	do	34	70	1.98	164

Daily gage height, in feet, of Owens River near Round Valley, Cal., for 1910.

[L. L. Roberts, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	.....	2.15	2.1	2.4	3.2	2.5	.....	2.0	1.95	2.0	1.9
2	.....	2.1	.....	.....	.....	.....	.....	2.35	.....	.....	.....	.....
3	2.5	.....	2.2	2.15	2.35	3.3	2.4	.....	2.15	1.95	2.1	1.9
4	.....	2.0	2.2	.....	.....	3.4	.....	2.3	2.1	.....	.....	2.0
5	2.4	2.1	.....	2.1	2.4	3.2	2.45	2.3	.....	2.0	2.0	.....
6	.....	.....	2.2	2.15	.....	3.25	2.4	.....	2.1	.....	2.05	1.9
7	2.3	2.0	2.2	.....	2.4	.....	.....	2.2	.....	2.0	.....	.....
8	.....	.....	2.25	2.1	2.45	3.2	2.45	.....	2.0	.....	2.0	1.95
9	2.1	2.1	.....	.....	.....	.....	.....	2.1	.....	2.1	.....	.....
10	.....	.....	2.2	2.15	2.5	3.3	2.4	.....	2.05	.....	2.05	1.85
11	2.0	2.0	2.25	2.2	2.55	.....	.....	2.1	2.0	2.05	.....	1.85
12	.....	.....	.....	.....	.....	3.15	2.4	2.0	.....	.....	2.0	.....
13	2.0	2.1	2.2	2.15	2.5	.....	.....	.....	2.0	2.1	.....	1.9
14	.....	.....	.....	.....	.....	3.2	2.4	2.2	.....	2.1	2.05	.....
15	2.0	2.1	2.2	2.2	2.6	.....	.....	.....	2.0	.....	.....	1.95
16	.....	.....	.....	2.1	2.6	3.1	2.45	2.15	.....	2.15	1.95	.....
17	2.0	2.1	2.2	2.2	2.6	3.15	2.4	.....	2.05	.....	1.9	1.95
18	.....	2.1	.....	.....	2.6	3.0	.....	2.1	.....	2.05	.....	2.0
19	2.0	.....	2.2	2.15	.....	3.0	2.45	.....	2.0	.....	1.85	.....
20	.....	2.1	.....	2.2	2.7	.....	.....	2.0	.....	2.1	.....	2.0
21	2.1	2.1	2.1	.....	.....	2.9	2.4	.....	2.05	2.0	1.9	.....
22	.....	.....	.....	2.15	2.7	2.9	.....	2.1	.....	.....	.....	2.0
23	2.1	2.1	2.15	.....	.....	2.7	2.45	.....	2.0	2.0	1.8	.....
24	.....	.....	.....	2.3	2.8	2.6	.....	2.0	.....	.....	.....	1.95
25	2.1	2.15	2.1	2.3	.....	.....	2.4	.....	2.05	2.05	1.85	.....
26	.....	.....	.....	2.4	2.8	2.55	.....	2.1	.....	2.1	.....	2.0
27	2.1	2.1	2.1	2.35	2.85	2.5	2.5	.....	2.0	2.1	.....	.....
28	.....	2.1	.....	2.4	.....	.....	2.6	2.0	.....	.....	1.8	1.95
29	2.1	.....	2.1	.....	2.8	2.5	.....	.....	1.9	2.1	1.85	1.95
30	.....	.....	.....	2.35	.....	.....	2.5	2.1	1.85	2.0	.....	.....
31	2.0	.....	2.1	.....	3.0	.....	2.35	.....	.....	2.1	.....	2.0

Daily discharge, in second-feet, of Owens River near Round Valley, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	370	192	221	206	301	596	335	284	177	164	177	151
2	352	206	228	214	292	616	318	284	199	164	192	151
3	335	192	236	221	284	636	301	276	221	164	206	151
4	318	177	236	214	292	676	310	268	206	170	192	177
5	301	206	236	206	301	596	318	268	206	177	177	164
6	284	192	236	221	301	616	301	252	206	177	192	151
7	268	177	236	214	301	606	310	236	192	177	184	158
8	247	192	252	206	318	596	318	221	177	192	177	164
9	206	206	244	214	326	616	310	206	184	206	184	151
10	192	192	236	221	335	636	301	206	192	199	192	139
11	177	177	252	236	352	606	301	206	177	192	184	139
12	177	192	244	228	344	576	301	177	177	199	177	145
13	177	206	236	221	335	586	301	206	177	206	184	151
14	177	206	236	228	352	596	301	236	177	206	192	158
15	177	206	236	236	370	576	310	228	177	214	177	164
16	177	206	236	206	370	556	318	221	184	221	164	164
17	177	206	236	236	370	576	301	214	192	206	151	164
18	177	206	236	228	370	517	310	206	184	192	145	177
19	177	206	236	221	388	517	318	192	177	199	139	177
20	192	206	221	236	405	498	310	177	184	206	145	177
21	206	206	206	228	405	478	301	192	192	177	151	177
22	206	206	214	221	405	478	310	206	184	177	139	177
23	206	206	221	244	423	405	318	192	177	177	127	170
24	206	214	214	268	441	370	310	177	184	184	133	164
25	206	221	206	268	441	361	301	192	192	192	139	170
26	206	214	206	301	441	352	318	206	184	206	135	177
27	206	206	206	284	460	335	335	192	177	206	131	170
28	206	206	206	301	450	335	370	177	164	206	127	164
29	206	.....	206	292	441	335	352	192	151	206	139	164
30	192	.....	206	284	478	335	335	206	139	177	145	170
31	177	.....	206	.....	517	.....	284	192	.....	206	.....	177

NOTE.—Daily discharge determined from a discharge rating curve well-defined above 180 second-feet and fairly well defined below. Discharge interpolated for days on which gage was not read.

Monthly discharge of Owens River near Round Valley, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	370	177	222	13,600	B.
February	221	177	201	11,200	B.
March	252	206	227	14,000	A.
April	301	206	237	14,100	A.
May	517	284	374	23,000	A.
June	676	335	519	30,900	A.
July	370	284	314	19,300	A.
August	284	177	216	13,300	A.
September	221	139	184	10,900	B.
October	221	164	192	11,800	B.
November	206	127	163	9,700	B.
December	177	139	163	10,000	B.
The year	676	127	250	182,000	

OWENS RIVER NEAR TINEMAHA, CAL.

This station, which is located at a basaltic knoll known as Charlies Butte, in the floor of the valley about 7 miles south of Tinemaha, in sec. 2, T. 11 S., R. 34 E., Mount Diablo base and meridian, was regularly established September 20, 1906, but the city of Los Angeles had made frequent measurements since the beginning of 1906.

No water is diverted for some distance above and below this station. Tinemaha Creek is the first tributary above and Taboose the next below the station.

The gage is a vertical staff on the left bank; its datum has not been changed since the station was established.

Discharge measurements are made from a car and cable at the gage. When the discharge exceeds 1,800 second-feet, the river overflows the left bank and the station is inaccessible. At such times measurements are made from the county bridge near Citrus.

The channel is composed of sand and gravel and is somewhat shifting.

The record may be considered good.

Discharge measurements of Owens River near Tinemaha, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 11	R. E. Haines	89	243	3.10	620
Apr. 2	....do	85	154	1.99	313
19	....do	53	66	.62	99
May 13	....do	57	80	.93	152
June 26	C. H. Lee	86	133	1.58	265
July 14	....do	56	93	1.09	185
Aug. 4	....do	58	90	1.21	168
25[a]	F. G. Wood	47	63	.63	94
Sept. 19[a]	G. T. Peekema	46	66	.68	107
Oct. 24	....do	87	158	2.16	347
Nov. 2	....do	87	181	2.38	379
Dec. 23	....do	88	206	2.64	448

[a] Measurements made by wading.

Daily gage height, in feet, of Owens River near Tinemaha, Cal., for 1910.

Ray Bowers, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.4	2.9	2.75	1.95	0.8	3.0	1.5	1.55	0.65	0.8	2.25	2.55
2	5.1	2.75	2.8	1.9	.8	3.3	1.5	1.45	.65	.85	2.25	2.55
3	5.75	2.7	2.85	1.8	.75	3.3	1.4	1.35	.65	1.0	2.25	2.6
4	4.5	2.6	2.85	1.7	.75	3.3	1.3	1.25	.65	1.1	2.25	2.65
5	3.55	2.75	2.8	1.6	.7	3.35	1.25	1.15	.65	1.15	2.3	2.7
6	3.5	2.9	2.85	1.45	.7	3.0	1.25	1.1	.6	1.2	2.3	2.7
7	3.55	2.9	2.9	1.3	.7	3.0	1.25	1.1	.6	1.25	2.3	2.7
8	3.4	2.9	2.95	1.15	.8	2.9	1.2	1.05	.6	1.3	2.35	2.7
9	3.35	2.9	3.0	1.0	.95	2.75	1.15	1.0	.6	1.35	2.4	2.7
10	3.25	2.85	3.0	.95	1.0	2.65	1.0	.95	.6	1.35	2.4	2.7
11	3.2	2.85	3.1	.9	1.0	2.55	1.0	.9	.55	1.35	2.4	2.7
12	3.2	2.9	3.2	1.0	.95	2.45	1.05	.85	.55	1.3	2.4	2.7
13	3.15	2.85	3.2	1.1	1.0	2.45	1.05	.8	.55	1.5	2.4	2.75
14	3.1	2.8	3.2	1.0	1.0	2.5	1.1	.75	.55	1.6	2.5	2.7
15	3.15	2.75	3.15	.9	1.1	2.5	1.05	.75	.75	1.9	2.5	2.65
16	3.2	2.7	3.1	.75	1.25	2.55	1.0	.75	.65	2.05	2.5	2.55
17	3.2	2.65	3.15	.7	1.6	2.65	1.0	.75	.6	2.15	2.45	2.55
18	3.2	2.7	3.2	.65	1.9	2.5	1.35	.7	.7	2.2	2.45	2.55
19	3.15	2.7	3.25	.6	2.0	2.4	1.85	.7	.7	2.1	2.45	2.6
20	3.1	2.7	3.2	.7	1.9	2.3	2.25	.7	.7	2.05	2.4	2.6
21	3.05	2.7	2.9	.7	2.0	2.2	2.45	.65	.7	2.1	2.4	2.65
22	3.0	2.7	2.6	.7	1.95	2.0	2.3	.55	.75	2.15	2.4	2.7
23	3.05	2.7	2.5	.75	1.95	1.85	2.8	.5	.75	2.2	2.45	2.65
24	3.1	2.7	2.45	.7	2.0	1.75	2.85	.55	.75	2.2	2.45	2.6
25	3.1	2.7	2.4	.65	2.2	1.65	2.5	.65	.8	2.15	2.5	2.6
26	3.05	2.7	2.35	.7	2.4	1.5	2.25	1.2	.8	2.15	2.5	2.6
27	3.0	2.7	2.35	.75	2.3	1.5	2.1	1.0	.75	2.2	2.45	2.55
28	3.0	2.7	2.4	.75	2.3	1.5	2.0	.75	.75	2.2	2.4	2.6
29	3.0	.....	2.25	.7	2.5	1.5	2.1	.7	.75	2.25	2.4	2.5
30	3.0	.....	2.1	.7	2.65	1.5	1.9	.7	.8	2.25	2.5	2.55
31	3.0	.....	2.0	.....	2.8	.....	1.7	.65	.....	2.25	.....	2.5

Daily discharge, in second-feet, of Owens River near Tinemaha, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	910	524	491	324	125	547	241	250	102	125	384	447
2	1,120	491	502	315	125	618	241	232	102	132	384	447
3	1,320	480	513	296	118	618	223	214	102	155	384	458
4	939	458	513	277	118	618	205	196	102	171	384	469
5	679	491	502	259	110	630	196	180	102	180	394	480
6	666	524	513	232	110	547	196	171	95	188	394	480
7	679	524	524	205	110	547	196	171	95	196	394	480
8	642	524	536	180	125	524	188	163	95	205	404	480
9	630	524	547	155	148	491	180	155	95	214	415	480
10	606	513	547	148	155	469	155	148	95	214	415	480
11	594	513	570	140	155	447	155	140	88	214	415	480
12	594	524	594	155	148	426	163	132	88	205	415	480
13	582	513	594	171	155	426	163	125	88	241	415	491
14	570	502	594	155	155	436	171	118	88	259	436	480
15	582	491	582	140	171	436	163	118	118	315	436	468
16	594	480	570	118	196	447	155	118	102	344	436	447
17	594	469	582	110	259	469	155	118	95	363	426	447
18	594	480	594	102	315	436	214	110	110	373	426	447
19	582	480	606	95	334	415	306	110	110	353	426	458
20	570	480	594	110	315	394	384	110	110	344	415	458
21	558	480	524	110	334	373	426	102	110	353	415	469
22	547	480	458	110	324	334	394	88	118	363	415	480
23	558	480	436	118	324	306	502	82	118	373	426	469
24	570	480	426	110	334	286	513	88	118	373	426	458
25	570	480	415	102	373	268	436	102	125	363	436	458
26	558	480	396	110	415	241	384	188	125	363	436	458
27	547	480	396	118	394	241	353	155	118	373	426	447
28	547	480	415	118	394	241	334	118	118	373	415	458
29	547	.....	384	110	436	241	353	110	118	384	415	436
30	547	.....	353	110	469	241	315	110	125	384	436	447
31	547	.....	334	.....	502	.....	277	102	.....	384	.....	436

NOTE.—Daily discharge determined from a fairly well-defined discharge rating curve.

Monthly discharge of Owens River near Tinemaha, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	1,320	547	650	40,000	B.
February	524	458	494	27,400	B.
March	606	334	503	30,900	B.
April	324	95	160	9,520	B.
May	502	110	250	15,400	B.
June	630	241	424	25,200	B.
July	513	155	269	16,500	B.
August	250	82	139	8,550	B.
September	125	88	106	6,310	B.
October	384	125	286	17,600	B.
November	436	384	415	24,700	B.
December	491	436	464	28,500	B.
The year	1,320	82	346	251,000	

OWENS RIVER NEAR LONE PINE, CAL.

This station, which is located at the highway bridge on the road from Lone Pine to the Mount Whitney station on the Nevada & California Railroad, 2½ miles northeast of Lone Pine, in sec. 23, T. 15 S., R. 36 E., Mount Diablo base and meridian, was established June 12, 1908.

No water is diverted in the vicinity of the station, and no important tributaries enter the stream for some distance above the bridge.

The gage is a vertical staff attached to the bridge; its datum has not been changed since the station was established.

Discharge measurements are made from the bridge.

Both banks are low and overflow at flood stages. The channel is sandy but fairly permanent. The record may be considered good.

Discharge measurements of Owens River near Lone Pine, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 2	R. E. Haines	79	273	6.35	608
22	do	79	295	6.50	637
Apr. 12	do	53	97	4.25	175
May 5	do	52	76	3.90	129
24	do	72	156	4.85	306
June 28	C. H. Lee	58	115	4.53	217
July 21	do	59	149	4.92	285
Aug. 16	F. G. Wood	56	61	3.68	87
26[a]	G. T. Peekema	55	49	3.53	76
26	do	73	67	3.52	69
Sept. 3[a]	F. G. Wood	53	56	3.69	85
22[a]	G. T. Peekema	55	59	3.70	91
Oct. 27	do	78	202	5.25	325
Nov. 30	do	81	231	5.70	392

[a] Measurement made by wading.

Daily gage height, in feet, of Owens River near Lone Pine, Cal., for 1910.

[G. F. Marsh, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.5	6.1	5.95	5.1	3.9	5.5	4.45	4.4	3.7	3.8	5.35	5.7
2	7.7	5.9	6.0	5.0	3.9	5.8	4.45	4.35	3.7	3.8	5.35	5.7
3	8.5	6.0	6.0	5.0	3.85	6.0	4.45	4.35	3.75	3.85	5.35	5.75
4	9.1	6.2	6.1	5.1	3.8	6.1	4.5	4.4	3.7	3.8	5.4	5.85
5	10.2	6.3	6.15	5.0	3.85	6.2	4.5	4.35	3.7	3.85	5.4	5.9
6	8.7	6.4	6.2	5.0	3.95	6.5	4.5	4.1	3.7	4.0	5.45	5.95
7	8.2	6.5	6.2	4.9	3.95	6.4	4.55	4.1	3.7	4.05	5.5	6.0
8	8.1	6.5	6.3	4.8	4.0	6.2	4.5	4.0	3.7	4.2	5.55	6.0
9	7.3	6.4	6.35	4.7	4.0	6.0	4.45	3.9	3.65	4.25	5.6	6.0
10	7.3	6.1	6.4	4.5	4.85	5.4	4.45	3.95	3.7	4.3	5.6	6.0
11	7.3	6.0	6.45	4.5	4.1	5.6	4.4	3.8	3.7	4.35	5.65	6.0
12	7.2	6.1	6.45	4.3	4.05	5.5	4.4	3.85	3.65	4.4	5.65	6.0
13	7.1	6.1	6.45	4.1	4.0	5.45	4.2	3.55	3.6	4.45	5.7	6.0
14	7.0	6.2	6.5	4.1	4.0	5.4	4.1	3.6	3.65	4.5	5.7	6.0
15	7.0	6.3	6.5	4.1	4.0	5.4	4.0	3.65	3.75	4.5	5.75	6.0
16	7.0	6.5	6.5	4.05	3.95	5.4	4.0	3.6	3.65	4.9	5.75	6.0
17	7.05	6.5	6.5	4.05	4.0	5.5	4.0	3.6	3.65	5.05	5.7	6.0
18	7.1	6.5	6.55	4.0	4.1	5.5	3.95	3.55	3.6	5.1	5.7	5.95
19	7.05	6.4	6.5	4.0	4.2	5.4	4.1	3.6	3.65	5.2	5.7	5.95
20	7.0	6.3	6.5	4.0	4.6	5.4	4.2	3.65	3.7	5.3	5.7	5.95
21	7.0	6.2	6.5	4.0	4.9	5.6	4.5	3.6	3.75	5.35	5.7	5.95
22	7.0	6.1	6.5	4.0	4.9	5.2	4.9	3.65	3.7	5.4	5.7	6.0
23	6.95	6.1	6.2	3.9	4.95	5.0	5.0	3.6	3.75	5.35	5.7	6.05
24	6.9	6.1	5.0	3.9	4.9	4.8	5.2	3.55	3.75	5.3	5.7	6.05
25	6.9	6.05	5.9	3.9	5.0	4.7	5.4	3.55	3.75	5.3	5.7	6.05
26	6.85	6.0	5.8	3.9	5.0	4.5	5.6	3.6	3.8	5.3	5.7	6.05
27	6.85	6.0	5.8	3.9	5.1	4.5	5.0	3.6	3.8	5.25	5.7	6.0
28	6.8	6.0	5.8	3.9	5.1	4.45	5.0	3.6	3.8	5.3	5.7	6.0
29	6.8	.....	5.8	3.9	5.2	4.4	4.9	3.6	3.75	5.35	5.7	5.95
30	6.7	.....	5.6	3.9	5.3	4.4	4.5	3.65	3.8	5.35	5.7	5.95
31	6.7	.....	5.4	.....	5.4	.....	4.45	3.7	.....	5.35	.....	5.9

Daily discharge, in second-feet, of Owens River near Lone Pine, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	812	500	472	314	121	386	205	197	93	107	359	424
2	861	462	481	297	121	443	205	188	93	107	359	424
3	1,070	481	481	297	114	481	205	188	100	114	359	434
4	1,260	520	500	314	107	500	213	197	93	107	368	452
5	1,770	540	510	297	114	520	213	188	93	114	368	462
6	1,130	561	520	297	128	582	213	150	93	135	377	472
7	989	582	520	280	128	561	221	150	93	142	386	481
8	963	582	540	263	135	520	213	135	93	165	396	481
9	764	561	550	246	135	481	205	121	86	173	405	481
10	764	500	561	213	172	368	205	128	93	181	405	481
11	764	481	572	213	150	405	197	107	93	189	414	481
12	741	500	572	181	142	386	197	114	86	197	414	481
13	718	500	572	150	135	377	165	74	80	205	424	481
14	695	520	582	150	135	368	150	80	86	213	424	481
15	695	540	582	150	135	368	135	86	100	213	434	481
16	695	582	582	142	128	368	135	80	86	280	434	481
17	706	582	582	142	135	386	135	80	86	306	424	481
18	718	582	593	135	150	386	128	74	80	314	424	472
19	706	561	582	135	165	368	150	80	86	332	424	472
20	695	540	582	135	229	368	165	86	93	350	424	472
21	695	520	582	135	280	405	213	80	100	359	424	472
22	695	500	582	135	280	332	280	86	93	368	424	481
23	684	500	520	121	288	297	297	80	100	359	424	490
24	672	500	297	121	280	263	332	74	100	350	424	490
25	672	490	462	121	297	246	368	74	100	350	424	490
26	660	481	443	121	297	213	405	80	107	350	424	490
27	660	481	443	121	314	213	297	80	107	341	424	481
28	649	481	443	121	314	205	297	80	107	350	424	481
29	649	.....	443	121	332	197	280	80	100	359	424	472
30	626	.....	405	121	350	197	213	86	107	359	424	472
31	626	.....	368	.....	368	.....	205	93	.....	359	.....	472

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Owens River near Lone Pine, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	1,770	626	800	49,200	A.
February	582	462	522	29,000	A.
March	593	297	514	31,600	B.
April	314	121	186	11,100	A.
May	368	107	199	12,200	B.
June	582	197	373	22,200	A.
July	405	128	221	13,600	A.
August	197	74	110	6,760	A.
September	107	80	94.2	5,610	A.
October	368	107	253	15,600	A.
November	434	359	409	24,300	A.
December	490	424	473	29,100	B.
The year	1,770	74	346	250.000	

ROCK CREEK NEAR ROUND VALLEY, CAL.

This station, which is located at a footbridge on the Bishop and Long Valley road about two-thirds mile above the mouth of the creek, in sec. 9, T. 6 S., R. 31 E., Mount Diablo base and meridian, was established August 3, 1903, at the wagon bridge 400 feet farther upstream, and was removed to the present site in July, 1906.

Pine Creek, the principal tributary of Rock Creek, enters below the station. A number of small ditches divert water above the station. The drainage area above the mouth of Rock Creek canyon is approximately 46 square miles.

The gage is a vertical staff on the left bank.

Discharge measurements are made from the footbridge.

The channel is composed of sand and cobblestones and shifts somewhat. The record may be considered good up to October 14; after this date the discharge was computed by the indirect method for shifting channels and the record is fair.

Discharge measurements of Rock Creek near Round Valley, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 9	R. E. Haines	15	16	1.27	31
30	do	14	14	1.08	23
Apr. 21	do	15	16	1.18	28
May 11	do	16	23	1.69	52
June 25	C. H. Lee	16	25	1.80	58
July 11	do	16	25	1.78	56
Aug. 3	do	16	22	1.60	43
24	F. G. Wood	15	19	1.42	37
Sept. 18	G. T. Peekema	15	15	1.13	25
Oct. 22	do	16	21	1.52	35
Nov. 18	do	16	18	1.38	29
Dec. 31	do	16	18	1.33	30

Daily gage height, in feet, of Rock Creek near Round Valley, Cal., for 1910.

[L. L. Roberts, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.9		1.35	1.1	1.3	2.2	2.3		1.35	1.15	1.4	1.35
2		1.65						1.55				
3	1.9		1.4	1.15	1.3	2.3	2.1		1.35	1.2	1.45	1.35
4		1.6	1.4			2.4		1.5	1.25			1.4
5	1.8	1.65		1.1	1.35	2.3	2.15	1.5		1.2	1.4	
6			1.35	1.15		2.2	2.0		1.2		1.4	1.4
7	1.6	1.7	1.3		1.35			1.4		1.2		
8			1.3	1.1	1.4	2.2	2.0		1.1		1.35	1.45
9	1.5	1.7						1.35		1.2		
10			1.25	1.15	1.35	2.2	1.8		1.15		1.4	1.4
11	1.4	1.65	1.2	1.15	1.45			1.4	1.1	1.2		1.45
12						2.15	1.75	1.4			1.45	
13	1.4	1.6	1.2	1.1	1.4				1.15	1.3		1.4
14						2.1	1.65	1.3		1.4	1.4	
15	1.4	1.5	1.25	1.15	1.5				1.15			1.4
16				1.1	1.5	2.0	1.65	1.3		1.5	1.35	
17	1.4	1.4	1.2	1.2	1.55	2.1	1.65		1.15		1.35	1.35
18		1.4				1.9		1.4		1.45		1.35
19	1.5		1.2	1.2	1.5	1.9	1.65		1.1		1.3	
20		1.3			1.6			1.4		1.5		1.3
21	1.5	1.3	1.2	1.25		1.7	1.6		1.1	1.4	1.35	
22				1.2	1.6	1.7		1.4				1.35
23	1.55	1.3	1.2			1.5	1.65		1.0	1.45	1.3	
24				1.3	1.7	1.4		1.5				1.35
25	1.6	1.3	1.2	1.35			1.6		1.05	1.45	1.35	
26				1.4	1.7	1.4		1.4		1.5		1.4
27	1.55	1.3	1.2	1.35	1.8	1.45	1.65		1.0	1.5		
28		1.35		1.35			1.6	1.35			1.3	1.35
29	1.6		1.2		1.8	1.4			1.1	1.5	1.35	1.35
30				1.3			1.65	1.35	1.1	1.5		
31	1.65		1.2		1.9		1.5			1.5		1.4

Daily discharge, in second-feet, of Rock Creek near Round Valley, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	63	49	34	23	32	81	87	42	34	25	30	29
2	63	49	35	24	32	84	80	43	34	26	31	29
3	63	47	36	25	32	87	74	42	34	27	32	29
4	60	46	36	24	33	94	76	41	29	27	31	31
5	57	49	35	23	34	87	78	41	28	27	30	31
6	52	50	34	25	34	81	68	38	27	27	30	31
7	46	51	32	24	34	81	68	36	25	27	29	32
8	44	51	32	23	36	81	68	35	23	27	28	34
9	41	51	30	24	35	81	62	34	24	27	29	33
10	38	50	29	25	34	81	57	35	25	27	30	32
11	36	49	27	25	38	80	56	36	23	27	31	34
12	36	48	27	24	37	78	54	36	24	30	32	33
13	36	46	27	23	36	76	52	34	25	32	31	32
14	36	44	28	24	38	74	49	32	25	36	30	32
15	36	41	29	25	41	71	49	32	25	38	29	32
16	36	38	28	23	41	68	49	32	25	40	28	31
17	36	36	27	27	43	74	49	34	25	37	28	30
18	38	36	27	27	42	63	49	36	24	35	29	30
19	41	34	27	27	41	63	49	36	23	36	26	29
20	41	32	27	28	46	57	47	36	23	36	27	28
21	41	32	27	29	46	51	46	36	23	30	28	29
22	42	32	27	27	46	51	48	36	21	35	27	30
23	43	32	27	30	48	41	49	38	19	32	26	30
24	44	32	27	32	51	36	47	41	20	32	27	30
25	46	32	27	34	51	36	46	39	21	32	28	32
26	45	32	27	36	51	36	48	36	20	34	27	33
27	43	32	27	34	57	38	49	35	19	34	27	32
28	44	34	27	34	57	37	46	34	21	34	26	33
29	46		27	33	57	36	47	34	23	34	28	31
30	48		27	32	60	62	49	34	23	34	28	32
31	49		27		63		41	34		34		33

NOTE.—Daily discharge Jan. 1 to Oct. 14 determined from a well-defined discharge rating curve; Oct. 15 to Dec. 31 indirect method for shifting channels used. Discharge interpolated for days on which gage was not read.

Monthly discharge of Rock Creek near Round Valley, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	63	36	44.8	2,750	B.
February	51	32	41.2	2,290	B.
March	36	27	29.2	1,800	B.
April	36	23	27.1	1,610	B.
May	63	32	42.8	2,630	B.
June	94	36	65.5	3,900	B.
July	87	41	56.0	3,440	B.
August	43	32	36.4	2,240	B.
September	34	19	25.3	1,510	B.
October	40	25	31.6	1,940	B.
November	32	26	28.8	1,710	C.
December	34	28	31.1	1,910	C.
The year	94	19	38.3	27,700	

PINE CREEK NEAR ROUND VALLEY, CAL.

This station, which is located at a footbridge about 300 feet above the highway bridge on the road from Bishop to Long Valley, in sec. 9, T. 6 S., R. 31 E., Mount Diablo base and meridian, was originally established August 3, 1903, at a point about 100 feet above the mouth of the creek and 150 feet below the bridge, and was reestablished at the new site May 13, 1908.

Considerable water is diverted from the creek above the gaging station, and the water which passes the station is that which flows directly into Rock Creek. The drainage area above the mouth of Bercluin Canyon is approximately 32 square miles.

The present gage is a vertical staff on the left bank. The original gage datum has not been maintained.

Discharge measurements are made from the footbridge. The daily variation in stage of this creek during high water is large, owing to the effect of warm days and cool nights on the snow in the headwater region, but an attempt was made to record gage heights representing the mean for the day.

The channel is composed of lava rock and sand and is fairly permanent.

The discharge rating curve is fairly well defined, and the record may be considered fair.

Discharge measurements of Pine Creek near Round Valley, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
Mar. 9	R. E. Haines	9.6	12.8	3.58	4.3
30	....do	9.8	13.2	3.60	4.9
Apr. 21	....do	10	15	3.81	13
May 11	....do	10	14.4	3.72	9.2
June 25	C. H. Lee	12	25	4.50	65
Aug. 3	....do	11	16	3.95	20
24	F. G. Wood	10	14	3.80	11
July 11	C. H. Lee	12	21	4.20	42
Sept. 18	G. T. Peekema	10	12.7	3.60	4.9
Oct. 22	....do	10	13	3.60	4.9
Nov. 18	....do	10	13.2	3.63	5.4
Dec. 21	....do	10	13	3.60	4.7

Daily gage height, in feet, of Pine Creek near Round Valley, Cal., for 1910.

[L. L. Roberts, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.9	.....	3.6	3.4	3.75	5.6	4.4	.....	3.7	3.45	3.5	3.6
2	.....	3.6	.....	.....	.....	.....	.....	3.95	.....	.....	.....	.....
3	3.9	.....	3.65	3.45	3.75	5.7	4.2	.....	3.65	3.4	3.5	3.65
4	.....	3.6	3.6	.....	.....	5.8	.....	3.9	3.6	.....	.....	3.65
5	3.7	3.65	.....	3.4	3.85	5.7	4.3	3.8	.....	3.5	3.4	.....
6	.....	.....	3.6	3.4	.....	5.6	4.15	.....	3.6	.....	3.4	3.55
7	3.7	3.7	3.55	.....	3.85	.....	.....	3.6	.....	3.45	.....	.....
8	.....	.....	3.6	3.4	3.9	5.5	4.15	.....	3.6	.....	3.35	3.6
9	3.7	3.7	3.58	.....	.....	.....	.....	3.55	.....	3.5	.....	.....
10	.....	.....	3.55	3.45	4.0	5.6	4.1	.....	3.65	.....	3.45	3.55
11	3.7	3.7	3.55	3.55	4.2	.....	4.2	3.65	3.6	3.45	.....	3.65
12	.....	.....	.....	.....	.....	5.5	4.1	3.7	.....	.....	3.4	.....
13	3.7	3.7	3.55	3.5	4.3	.....	.....	.....	3.6	3.55	.....	3.55
14	.....	.....	.....	.....	.....	5.7	4.1	3.7	.....	3.5	3.5	.....
15	3.7	3.7	3.6	3.55	4.4	.....	.....	.....	3.5	.....	.....	3.6
16	.....	.....	.....	3.7	4.4	5.6	4.15	3.65	.....	3.55	3.55	.....
17	3.7	3.6	3.5	3.8	4.5	5.7	4.15	.....	3.5	.....	3.6	3.55
18	.....	3.6	.....	.....	.....	5.4	.....	3.6	.....	3.55	.....	3.6
19	3.6	.....	3.55	3.7	4.45	5.4	4.15	.....	3.45	.....	3.55	.....
20	.....	3.6	.....	3.8	4.6	.....	.....	3.6	.....	3.6	.....	3.55
21	3.65	3.65	3.5	3.81	.....	5.2	4.15	.....	3.45	3.55	3.6	.....
22	.....	.....	.....	3.65	4.7	5.2	.....	3.65	.....	.....	.....	3.6
23	3.6	3.6	3.55	.....	.....	5.0	4.2	.....	3.4	3.55	3.6	.....
24	.....	.....	.....	3.7	4.8	4.8	.....	3.7	.....	.....	.....	3.6
25	3.7	3.6	3.5	3.75	.....	4.5	4.2	.....	3.45	3.6	3.6	.....
26	.....	.....	.....	3.8	4.8	4.7	.....	3.7	.....	3.65	.....	3.6
27	3.7	3.6	3.5	3.9	4.9	4.7	4.25	.....	3.4	3.6	.....	.....
28	.....	3.6	.....	4.0	.....	.....	4.2	3.65	.....	.....	.....	3.6
29	3.65	.....	3.4	.....	5.0	4.6	.....	.....	3.45	3.6	3.55	3.6
30	.....	.....	3.6	3.8	.....	.....	3.95	3.7	3.4	3.55	3.6	.....
31	3.7	.....	3.4	.....	5.3	.....	3.9	.....	.....	3.6	.....	3.6

Daily discharge, in second-feet, of Pine Creek near Round Valley, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	17	6.4	4.8	1.5	10	239	57	18	8	2.2	2.8	4.8
2	17	4.8	5.6	1.8	10	248	47	20	7.2	1.8	2.8	5.6
3	17	4.8	6.4	2.2	10	258	39	18	6.4	1.5	2.8	6.4
4	12	4.8	4.8	1.8	12	277	43	17	4.8	2.2	2.2	6.4
5	8	6.4	4.8	1.5	14	258	47	12	4.8	2.8	1.5	4.8
6	8	7.2	4.8	1.5	14	239	35	8	4.8	2.5	1.5	3.8
7	8	8	3.8	1.5	14	230	35	4.8	4.8	2.2	1.4	4.3
8	8	8	4.8	1.5	17	220	35	4.3	4.8	2.5	1.2	4.8
9	8	8	4.4	1.8	20	230	33	3.8	5.6	2.8	1.5	4.3
10	8	8	3.8	2.2	24	239	31	4.8	6.4	2.5	2.2	3.8
11	8	8	3.8	3.8	39	230	39	6.4	4.8	2.2	1.8	6.4
12	8	8	3.8	3.3	43	220	31	8	4.8	2.8	1.5	4.8
13	8	8	3.8	2.8	47	239	31	8	4.8	3.8	2.2	3.8
14	8	8	4.3	3.3	52	258	31	8	3.8	2.8	2.8	4.3
15	8	8	4.8	3.8	57	248	33	7.2	2.8	3.3	3.3	4.8
16	8	6.4	3.8	8	57	239	35	6.4	2.8	3.8	3.8	4.3
17	8	4.8	2.8	12	68	258	35	5.6	2.8	3.8	4.8	3.8
18	6.4	4.8	3.3	10	65	201	35	4.8	2.5	3.8	4.3	4.8
19	4.8	4.8	3.8	8	62	201	35	4.8	2.2	4.3	3.8	4.3
20	5.6	4.8	3.3	12	80	182	35	4.8	2.2	4.8	4.3	3.8
21	6.4	6.4	2.8	12	86	164	35	5.6	2.2	3.8	4.8	4.3
22	5.6	5.6	3.3	6.4	92	164	37	6.4	1.8	3.8	4.8	4.8
23	4.8	4.8	3.8	7.2	98	132	39	7.2	1.5	3.8	4.8	4.8
24	6.4	4.8	3.3	8	105	105	39	8	1.8	4.3	4.8	4.8
25	8	4.8	2.8	10	105	68	39	8	2.2	4.8	4.8	4.8
26	8	4.8	2.8	12	105	92	41	8	1.8	6.4	5.0	4.8
27	8	4.8	2.8	17	118	92	43	7.2	1.5	4.8	5.3	4.8
28	7.2	4.8	2.2	24	125	86	39	6.4	1.8	4.8	5.5	4.8
29	6.4	.....	1.5	17	132	80	30	7.2	2.2	4.8	3.8	4.8
30	7.2	.....	4.8	12	156	68	20	8	1.5	3.8	4.8	4.8
31	8	.....	1.5	.....	182	.....	17	8	.....	4.8	.....	4.8

NOTE.—Daily discharge determined from a discharge rating curve well defined between 5 and 240 second-feet. Discharge interpolated for days on which gage was not read.

Monthly discharge of Pine Creek near Round Valley, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	17	4.8	8.38	515	C.
February	8	4.8	6.17	343	C.
March	6.4	1.5	3.78	232	C.
April	24	1.5	7.00	417	C.
May	182	10	65.1	4,000	C.
June	277	68	192	11,400	C.
July	57	17	36.2	2,230	C.
August	20	3.8	8.22	505	C.
September	8	1.5	3.65	217	C.
October	6.4	1.5	3.49	215	C.
November	5.5	1.2	3.36	200	C.
December	6.4	3.8	4.72	290	C.
The year	277	1.2	28.4	20,600	

BISHOP CREEK NEAR BISHOP, CAL.

This station, which is located at the wagon bridge on the Bishop road, about 4 miles southeast of Bishop and 2 miles below the mouth of Bishop Creek canyon, in sec. 9, T. 7 S., R. 32 E., Mount Diablo base and meridian, was established August 10, 1903.

The North Hillside, South Hillside, and Power canals head above the station. The amount of water in these canals, which is included

in the total discharge given in the list of discharge measurements, is dependent on the stage of the creek. No attempt has been made to estimate the amount diverted by the canals. The drainage area above the mouth of Bishop Creek canyon is approximately 63 square miles.

The gage is a vertical staff on the right bank at the bridge.

Discharge measurements are made from the bridge at the gage.

On June 25, 1909, the Nevada-California Power Co.'s equalizing dam at intake No. 2 went out and the bridge was carried away. The gage was left intact, but it was removed August 15, 1909, in building a new bridge. The bridge was completed August 23, and a new gage put in August 31 at approximately the original datum.

Both banks of the stream are high and the current is swift. The channel is rocky and is fairly permanent.

The 1910 discharge rating curve is fairly well defined and the results may be considered good.

Discharge measurements of Bishop Creek and canals near Bishop, Cal., in 1910.

Date.	Hydrographer.	Gage height.	Discharge.		
			Creek.	Canals.	Total.
		Feet.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*
Mar. 8	R. E. Haines	2.22	118	2.9	121
29	.....do	1.74	56	11	67
Apr. 20	.....do	2.30	130	4	134
May 10	.....do	2.55	168	13	181
June 24	C. H. Lee	2.10	97	32	129
July 11	.....do	2.30	112	51	163
Aug. 2	Lee and Wood	1.98	86	46	132
23	F. G. Wood	2.00	88	33	121
Sept. 17	G. T. Peekema	1.60	43	22	65
Oct. 21	.....do	2.00	90	13	103
Nov. 17	.....do	1.72	58	9.5	68
Dec. 20	.....do	1.72	47	14	61

Daily gage height, in feet, of Bishop Creek near Bishop, Cal., for 1910.

[C. R. Beal, A. F. Kirkpatrick, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.1	1.9	2.25	1.9	2.4	2.75	2.4	2.1	2.0	1.55	1.7	1.75
2	2.05	1.85	2.1	2.0	2.3	2.65	2.4	2.0	1.4	1.35	1.6	1.8
3	2.1	1.9	2.3	1.8	2.2	2.65	2.6	2.0	1.2	1.4	1.8	1.8
4	2.1	2.0	2.3	1.85	2.0	2.4	2.65	2.0	1.8	1.8	1.7	1.45
5	2.2	2.0	2.2	1.6	1.8	2.5	2.35	2.0	1.7	1.45	1.7	1.8
6	2.15	1.9	2.3	1.85	2.1	2.5	2.1	2.1	1.8	1.85	1.4	1.8
7	2.05	1.95	2.3	1.75	2.15	2.5	2.2	2.0	1.75	1.7	1.7	1.8
8	2.1	1.75	2.3	1.85	2.1	2.2	2.2	1.9	2.0	1.75	1.55	1.8
9	2.0	1.95	2.3	1.8	2.3	2.55	2.25	1.7	2.0	1.8	1.75	1.75
10	2.1	1.9	2.2	1.95	2.5	2.5	2.25	1.9	1.6	1.8	1.6	1.45
11	2.0	1.95	2.5	1.9	2.3	2.2	2.3	2.25	1.5	1.7	1.95	1.8
12	2.0	1.85	2.25	1.75	2.55	2.4	2.2	2.1	1.4	1.7	1.8	1.6
13	2.0	1.9	2.4	1.55	2.0	2.2	2.2	2.0	1.75	1.35	1.75	1.75
14	2.05	1.8	2.3	1.85	2.3	2.0	2.05	2.15	1.5	1.6	1.8	1.8
15	1.95	2.0	2.5	1.8	3.5	2.3	2.15	2.0	1.7	1.65	1.75	1.85
16	1.9	1.85	2.4	1.8	3.2	1.8	2.0	1.8	1.7	1.75	1.65	1.8
17	1.9	1.9	2.5	1.85	2.9	2.1	2.1	1.95	1.2	1.55	1.75	1.6
18	1.9	1.85	2.4	2.15	3.25	2.1	2.0	1.95	1.8	1.7	1.6	1.85
19	1.95	2.0	2.5	1.95	3.5	1.95	2.2	1.95	1.7	1.65	1.8	1.6
20	2.0	1.9	2.4	2.05	3.3	2.1	2.2	2.0	1.5	1.7	1.6	1.9
21	1.9	2.0	2.4	2.1	2.6	2.25	2.7	2.0	1.4	1.75	1.8	1.8
22	2.0	1.9	2.3	2.35	3.25	1.85	4.0	2.0	1.55	1.85	1.6	1.9
23	1.9	2.1	2.4	2.5	3.2	2.0	3.9	2.0	1.6	1.65	1.8	1.85
24	1.9	1.9	2.3	2.25	3.0	2.1	2.2	3.9	1.5	1.7	1.5	1.5
25	1.9	2.0	2.35	1.95	3.1	2.2	2.1	2.2	1.6	1.65	1.8	1.6
26	1.9	2.1	2.3	2.55	2.5	2.2	1.95	2.2	1.4	1.7	1.65	1.75
27	1.9	2.1	2.3	2.5	2.4	2.45	1.8	1.8	1.65	1.75	1.8	1.3
28	1.9	2.0	2.1	2.35	2.7	2.4	2.2	2.0	1.4	1.85	1.75	1.8
29	1.9	.....	2.0	1.8	2.6	2.5	2.1	2.0	1.75	1.7	1.8	1.75
30	1.9	.....	1.9	2.25	2.8	2.4	1.9	1.95	1.75	1.7	1.55	1.8
31	1.9	.....	2.0	.....	2.6	.....	1.8	2.1	.....	1.65	.....	1.6

Daily discharge, in second-feet, of Bishop Creek near Bishop, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	97	73	117	73	138	198	138	97	85	39	52	57
2	91	68	97	85	124	180	138	85	28	25	43	62
3	97	73	124	62	110	180	171	85	17	28	62	62
4	97	85	124	68	85	138	180	85	62	62	52	32
5	110	85	110	43	62	154	131	85	52	32	52	62
6	117	73	124	68	97	154	97	97	62	68	28	62
7	91	79	124	57	104	154	110	85	57	52	52	62
8	97	57	124	68	97	110	110	73	85	57	39	62
9	85	79	124	62	124	162	117	52	85	62	57	57
10	97	73	110	79	154	154	117	73	43	62	43	32
11	85	79	154	73	124	110	124	117	35	52	79	62
12	85	68	117	57	162	138	110	97	28	52	62	43
13	85	73	138	39	85	110	110	85	57	25	57	57
14	91	62	124	68	124	85	91	104	35	43	62	62
15	79	85	154	62	359	124	104	85	52	48	57	68
16	73	68	138	62	291	62	85	62	52	57	48	62
17	73	73	154	68	228	97	97	79	17	39	57	43
18	73	68	138	104	302	97	85	79	62	52	43	68
19	79	85	154	79	359	79	110	79	52	48	62	43
20	85	73	138	91	313	97	110	85	35	52	43	73
21	73	85	138	97	171	117	189	85	28	57	62	62
22	85	73	124	131	302	68	477	85	39	68	43	73
23	73	97	138	154	291	85	453	85	43	48	62	68
24	73	73	124	117	248	97	110	453	35	52	35	35
25	73	85	131	79	269	110	97	110	43	48	62	43
26	73	97	124	162	154	110	79	110	28	52	48	57
27	73	97	124	154	138	144	62	62	48	57	62	22
28	73	85	97	131	189	138	110	85	28	68	57	62
29	73	.....	85	62	171	154	97	85	57	52	62	57
30	73	.....	73	117	208	138	73	79	57	52	39	62
31	73	.....	85	.....	171	.....	62	97	.....	48	.....	43

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined between 40 and 170 second-feet. Curve not well defined above 200 second-feet.

Monthly discharge of Bishop Creek near Bishop, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	117	73	83.9	5,160	B.
February	97	57	77.5	4,300	B.
March	154	73	124	7,620	B.
April	162	39	85.7	5,100	B.
May	359	62	186	11,400	C.
June	198	62	125	7,440	B.
July	477	62	134	8,240	C.
August	453	52	97.6	6,000	C.
September	85	17	46.9	2,790	B.
October	68	25	50.2	3,090	B.
November	79	28	52.7	3,140	B.
December	73	22	55.3	3,400	B.
The year	477	17	93.4	67,700	

NOTE.—Estimates do not include the amounts diverted by irrigating canals above the station.

BAKER CREEK NEAR BIG PINE, CAL.

This station, which is located at a point about 150 feet below the bridge on Millpond road and about 3 miles west of the town of Big Pine, was established February 20, 1908.

No observations of gage heights were made during 1910.

The staff gage is at the footbridge from which the following discharge measurements were made during 1910:

Discharge measurements of Baker Creek near Big Pine, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 10	R. E. Haines	3.6	4.0	0.05	11
Apr. 1	do	3.7	3.8	.00	9.1
22	do	4.6	6.6	.60	25
May 12	do	3.6	3.9	.00	9.9
June 25[a]	C. H. Lee	5.0	4.9	.....	7.9
Aug. 3[a]	Lee and Wood	5.3	3.5	.....	2.9

[a] Made at road crossing above diversion.

BIG PINE CREEK NEAR BIG PINE, CAL.

This station, which is located at a footbridge about 2 miles southwest of Big Pine, in sec. 26, T. 9 S., R. 33 E., Mount Diablo base and meridian, was originally established December 5, 1903, at a point about 3 miles southwest of Big Pine, where the creek issues from the foothills, and was moved to the present site about half a mile farther east on October 29, 1907. No record of gage heights was kept from January 1, 1906, to May 22, 1908.

Water is diverted both above and below the station for irrigation. The drainage area above the mouth of the canyon is about 27 square miles.

The gage is a vertical staff on the right bank.

Discharge measurements are made from the footbridge near the gage.

The channel, which is composed of gravel and bowlders, is somewhat shifting.

The 1910 discharge rating curve is fairly well defined and the record may be considered good.

Discharge measurements of Big Pine Creek near Big Pine, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 10	R. E. Haines	10	23	2.72	20
Apr. 1	do	10	22	2.67	18
22	do	10	26	2.98	33
May 12	do	11	29	3.23	50
June 23	C. H. Lee	12	32	3.42	69
July 13	do	14	38	3.82	106
Aug. 1	Wood and Lee	15	36	3.77	100
22	F. G. Wood	12	29	3.50	73
Sept. 16	G. T. Peekema	11	26	3.03	41
Oct. 21	do	11	22	2.80	25
Nov. 19	do	11	19	2.63	16
Dec. 22	do	11	19	2.50	12

Daily gage height, in feet, of Big Pine Creek near Big Pine, Cal., for 1910.

[Mrs. M. L. Gaylord and Hugh Fisher, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.7	2.6			3.9		3.7			2.7	2.5
2				2.7	3.1		3.7		3.25	2.9		
3		2.7	2.6			4.2		3.7			2.6	2.6
4	3.0				3.1				3.2	2.9		
5		2.6	2.7	2.7			3.4	3.8			2.65	2.5
6	3.0				3.1	3.6			3.1	2.9		
7		2.6		2.7			3.6	3.7			2.6	2.5
8	3.0		2.7		3.1	3.6			3.1	2.9		
9		2.6		2.7			3.8			2.9	2.6	2.5
10	3.0		2.7		3.2	3.8		3.7	3.1			
11		2.6								2.85	2.65	2.5
12	3.0		2.7	2.8	3.2		3.8	3.6	3.1			
13						4.0				2.9	2.6	2.45
14		2.7		2.8	3.2		3.9	3.5	3.05			
15	2.7		2.7			3.7				2.9	2.7	2.5
16		2.7		2.8	3.2		3.7		3.05			
17			2.7		3.4	3.4		3.5		2.85	2.65	2.4
18	2.7	2.7							2.9			
19			2.7	2.9	3.4		4.8	3.3		2.8	2.6	2.5
20	2.7								2.8			
21		2.7		2.9	3.4	3.4	3.9	3.6		2.85	2.55	2.45
22	2.6		2.7						2.9			
23		2.7		3.0	4.0	3.6	3.8	3.6		2.85	2.5	2.5
24			2.7						2.95			
25	2.7	2.6			4.0	3.6		3.6		2.8	2.5	2.5
26			2.7	3.2			4.2		3.0			
27	2.7					3.4		3.5		2.7	2.5	2.5
28		2.6	2.7	3.2	4.0		3.9		2.9			
29	2.7					3.6		3.4		2.75	2.5	2.5
30			2.7	3.3	4.0		3.8		2.9			
31								3.3				2.55

Daily discharge, in second-feet, of Big Pine Creek near Big Pine, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	35	20	16	20	49	115	91	94	55	29	20	13
2	35	20	16	20	42	134	94	94	53	29	18	14
3	35	20	16	20	42	154	84	94	51	29	16	16
4	35	18	18	20	42	135	75	99	49	29	17	14
5	35	16	20	20	42	107	66	104	46	29	18	13
6	35	16	20	20	42	84	75	99	42	29	17	13
7	35	16	20	20	42	84	84	94	42	29	16	13
8	35	16	20	20	42	84	94	94	42	29	16	13
9	35	16	20	20	46	94	104	94	42	29	16	13
10	35	16	20	21	49	104	104	94	42	28	17	13
11	35	16	20	23	49	112	104	89	42	26	18	13
12	35	17	20	24	49	120	104	84	42	28	17	12
13	30	19	20	24	49	127	110	88	40	29	16	11
14	25	20	20	24	49	110	115	75	38	29	18	12
15	20	20	20	24	49	94	104	75	38	29	20	13
16	20	20	20	24	49	80	94	75	38	28	19	11
17	20	20	20	26	66	66	147	75	34	26	18	10
18	20	20	20	27	66	66	199	66	29	25	17	11
19	20	20	20	29	66	66	252	57	26	24	16	13
20	20	20	20	29	66	66	184	70	24	25	15	12
21	18	20	20	29	66	66	115	84	26	26	14	11
22	16	20	20	32	96	75	110	84	29	26	14	12
23	17	20	20	35	127	84	104	84	30	26	13	13
24	19	18	20	40	127	84	120	84	32	25	13	13
25	20	16	20	44	127	84	138	84	34	24	13	13
26	20	16	20	49	127	75	154	80	35	22	13	13
27	20	16	20	49	127	66	134	75	32	20	13	13
28	20	16	20	49	127	75	115	70	29	21	13	13
29	20	.....	20	53	127	84	110	66	29	22	13	13
30	20	.....	20	57	127	87	104	62	29	21	13	14
31	20	.....	20	.....	121	.....	99	57	.....	20	.....	14

NOTE.—Daily discharge determined from a discharge rating curve well defined below 120 second-feet and fairly well defined above. Discharge interpolated for days on which gage was not read.

Monthly discharge of Big Pine Creek near Big Pine, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	35	16	26.0	1,600	B.
February	20	16	18.1	1,010	B.
March	20	16	19.5	1,200	B.
April	57	20	29.7	1,770	A.
May	127	42	74.0	4,550	A.
June	154	66	92.6	5,510	A.
July	252	66	116	7,130	B.
August	104	57	82.1	5,050	A.
September	55	24	37.3	2,220	B.
October	29	20	26.2	1,610	B.
November	20	13	15.9	946	B.
December	16	10	12.7	781	B.
The year	252	10	46.1	33,400	

BIRCH CREEK NEAR TINEMAHA, CAL.

This station, which is located at a point near Peterson's ranch house, about 1 mile west of Fish Springs schoolhouse, and about 8 miles south of Big Pine, in sec. 16, T. 10 S., R. 34 E., Mount Diablo base and meridian, was established June 14, 1905, discontinued December 9, 1905, and reestablished December 7, 1906.

No water is diverted above or near the station. The drainage area above the mouth of the canyon is approximately 7 square miles.

The gage is a vertical staff on the left bank.

Discharge measurements are made from the footbridge at the gage.

The bed of the stream consists of coarse gravel and sand and shifts somewhat. Both banks are low but not subject to overflow. The current is swift at all stages.

The estimates of daily discharge for 1910 were prepared by the indirect method for shifting channels and from rating tables covering short periods. The record may be considered fair.

Discharge measurements of Birch Creek near Tinemaha, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 7	R. E. Haines	4.6	3.7	0.28	5.3
28	do	4.8	3.8	.27	4.9
Apr. 23	do	5.0	4.2	.36	8.4
May 9	do	4.6	4.0	.33	6.9
June 23	C. H. Lee	5.5	4.6	.46	12
July 13	do	5.5	6.2	.62	21
Aug. 1	Lee and Wood	5.5	5.4	.58	19
22	F. G. Wood	5.3	5.1	.52	13
Sept. 16	G. T. Peekema	5.2	4.4	.36	5.7
Oct. 20	do	5.6	3.8	.30	3.4
Nov. 16	do	5.4	3.9	.30	3.4
Dec. 19	do	5.4	4.0	.33	3.7

Daily gage height, in feet, of Birch Creek near Tinemaha, Cal., for 1910.

[Jessie Burdick and A. Clendenen, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.8	0.4	0.4	.....	0.4	0.8	0.6	0.6	0.44	0.3	0.4	0.3
2	.7	.4	.3	.....	.4	.8	.5	.6	.45	.3	.3	.3
3	.7	.5	.4	0.3	.4	.8	.6	.6	.45	.3	.3	.3
4	.4	.4	.4	.3	.4	.7	.5	.6	.35	.3	.3	.4
5	.4	.4	.4	.3	.3	.7	.5	.6	.40	.3	.3	.4
6	.4	.5	.3	.4	.4	.6	.5	.6	.37	.3	.3	.3
7	.6	.4	.3	.3	.4	.6	.6	.6	.41	.3	.3	.3
8	.4	.3	.3	.3	.4	.6	.5	.6	.34	.3	.3	.3
9	.4	.3	.4	.4	.4	.6	.6	.6	.38	.3	.3	.3
10	.3	.3	.3	.4	.4	.7	.5	.6	.32	.3	.3	.3
11	.4	.3	.3	.5	.4	.7	.6	.6	.30	.3	.3	.35
12	.4	.4	.3	.5	.4	.7	.6	.6	.30	.3	.3	.3
13	.4	.4	.3	.4	.5	.6	.7	.6	.35	.3	.3	.3
14	.5	.3	.4	.4	.5	.6	.6	.5	.30	.3	.3	.3
15	.5	.3	.3	.3	.5	.6	.6	.5	.40	.45	.3	.3
16	.5	.4	.3	.3	.5	.6	.6	.5	.40	.4	.3	.3
17	.5	.4	.4	.4	.4	.6	.6	.5	.40	.3	.3	.3
18	.5	.3	.4	.3	.4	.6	1.05	.3	.30	.3	.3	.35
19	.4	.4	.3	.4	.4	.6	1.1	.5	.30	.3	.3	.3
20	.4	.3	.3	.4	.4	.6	.8	.5	.31	.3	.3	.3
21	.5	.3	.3	.5	.4	.5	1.0	.5	.30	.3	.3	.3
22	.4	.3	.3	.4	.5	.5	.6	.5	.10	.3	.3	.3
23	.5	.3	.4	.4	.5	.5	.7	.51	.30	.3	.3	.3
24	.4	.3	.4	.4	.5	.5	.6	.65	.30	.3	.3	.3
25	.4	.4	.3	.4	.5	.6	.7	.54	.30	.3	.3	.4
26	.3	.4	.3	.3	.5	.5	.6	.50	.10	.3	.3	.35
27	.4	.3	.3	.4	.5	.6	.7	.50	.30	.3	.3	.3
28	.4	.4	.3	.3	.6	.6	.6	.60	.11	.3	.3	.3
29	.3	.....	.4	.4	.7	.7	.7	.55	.25	.3	.3	.3
30	.4	.....	.3	.4	.8	.6	.6	.45	.30	.3	.3	.35
31	.4	.....	.3	.....	.9	.....	.6	.45	.....	.3	.....	.3

Daily discharge, in second-feet, of Birch Creek near Tinemaha, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	33	9.5	9.5	6	9.5	33	20	19	9	3.5	7	3.5
2	26	9.5	6	6	9.5	33	14	19	9.5	3.5	3.5	3.5
3	26	14	9.5	6	9.5	33	20	19	9.5	3.5	3.5	3.5
4	9.5	9.5	9.5	6	9.5	26	14	19	5.2	3.5	3.5	7
5	9.5	9.5	9.5	6	6	26	14	19	7	3.5	3.5	7
6	9.5	14	6	9.5	9.5	20	14	18	5.9	3.5	3.5	3.5
7	20	9.5	6	6	9.5	20	20	18	7.5	3.5	3.5	3.5
8	9.5	6	6	6	9.5	20	14	18	4.9	3.5	3.5	3.5
9	9.5	6	9.5	9.5	9.5	20	20	18	6.3	3.5	3.5	3.5
10	6	6	6	9.5	9.5	26	14	18	4.2	3.5	3.5	3.5
11	9.5	6	6	14	9.5	26	20	17	3.5	3.5	3.5	5.2
12	9.5	9.5	6	14	9.5	26	20	17	3.5	3.5	3.5	3.5
13	9.5	9.5	6	9.5	14	20	26	17	5.2	3.5	3.5	3.5
14	14	6	9.5	9.5	14	20	20	14	3.5	3.5	3.5	3.5
15	14	6	6	6	14	20	20	14	7	9.5	3.5	3.5
16	14	9.5	6	6	14	20	20	14	7	7	3.5	3.5
17	14	9.5	9.5	9.5	9.5	20	20	14	7	3.5	3.5	3.5
18	14	6	9.5	6	9.5	20	50	5	3.5	3.5	3.5	5.2
19	9.5	9.5	6	9.5	9.5	20	54	13	3.5	3.5	3.5	3.5
20	9.5	6	6	9.5	9.5	20	33	13	3.8	3.5	3.5	3.5
21	14	6	6	14	9.5	14	47	13	3.5	3.5	3.5	3.5
22	9.5	6	6	9.5	14	14	20	13	.5	3.5	3.5	3.5
23	14	6	9.5	9.5	14	14	26	13	3.5	3.5	3.5	3.5
24	9.5	6	9.5	9.5	14	14	20	21	3.5	3.5	3.5	3.5
25	9.5	9.5	6	9.5	14	20	26	14	3.5	3.5	3.5	7
26	6	9.5	6	6	14	14	20	12	.5	3.5	3.5	5.2
27	9.5	6	6	9.5	14	20	26	12	3.5	3.5	3.5	3.5
28	9.5	9.5	6	6	20	20	20	18	.6	3.5	3.5	3.5
29	6	.....	9.5	9.5	26	26	26	15	2.5	3.5	3.5	3.5
30	9.5	.....	6	9.5	33	20	20	9.5	3.5	3.5	3.5	5.2
31	9.5	.....	6	.....	40	.....	20	9.5	.....	3.5	.....	3.5

NOTE.—Daily discharge determined as follows: Jan. 1 to Aug. 1, from a discharge rating curve well defined below 45 second-feet; Aug. 2 to 21, by indirect method for shifting channels; Aug. 22 to Dec. 31, from a rating curve fairly well defined between 3 and 17 second-feet.

Monthly discharge of Birch Creek near Tinemaha, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	33	6	12.3	756	B.
February	14	6	8.20	455	B.
March	9.5	6	7.24	445	B.
April	14	6	8.55	509	B.
May	40	6	13.5	830	B.
June	33	14	21.5	1,280	B.
July	54	14	23.2	1,430	B.
August	21	5	15.3	941	B.
September	9.5	.5	4.72	281	C.
October	9.5	3.5	3.81	234	C.
November	7	3.5	3.62	215	C.
December	7	3.5	4.06	250	C.
The year	54	.5	10.5	7,630	

TINEMAHA CREEK NEAR TINEMAHA, CAL.

This station, which is located at a point near Peterson's ranch house, about 1 mile west of Fish Springs schoolhouse and 8 miles south of Big Pine, in sec. 21, T. 10 S., R. 34 E., Mount Diablo base and meridian, was established December 7, 1906.

No water is diverted above or near the station. The drainage area above the mouth of the canyon is approximately 5.2 square miles.

The gage is a vertical staff on the right bank.

Discharge measurements are made from the footbridge at the gage.

The channel is composed of gravel and shifts somewhat.

The estimates of daily discharge for 1910 were prepared by the indirect method for shifting channels. The record may be considered fair.

Discharge measurements of Tinemaha Creek near Tinemaha, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 7	R. E. Haines	9	4.4	0.75	6.1
28	do	5.5	7	.72	4.8
Apr. 23	do	5.8	6.7	.72	4.4
May 9	do	6.5	8.5	.86	8.5
June 23	do	10	7.8	1.10	18
July 13	C. H. Lee	10	9.6	1.20	24
Aug. 1	do	10	8	1.18	19
22	F. G. Wood	9.7	6.4	1.03	13
Sept. 16	G. T. Peekema	8.8	4.9	.84	7.9
Oct. 20	do	8.8	4.1	.73	5.4
Nov. 16	do	8.5	4	.68	5
Dec. 19	do	8.5	3.8	.70	4.5

Daily gage height, in feet, of Tinemaha Creek near Tinemaha, Cal., for 1910.

[Jessie Burdick and C. A. Clendenen, observers.]

Day	Jan.	Feb.	Mar.	Apr.	May	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.2	0.8	0.9	.....	0.9	1.7	1.3	1.2	1.05	0.8	0.7	0.7
2	1.0	.9	.8	.....	.8	1.7	1.2	1.2	1.0	.8	.7	.7
3	.9	1.0	.9	0.7	.8	1.6	1.2	1.2	1.05	.75	.7	.7
4	.8	.9	.9	.7	.8	1.6	1.1	1.3	.85	.8	.7	.75
5	.8	.9	.8	.7	.8	1.5	1.1	1.1	1.0	.8	.65	.75
6	.8	.8	.8	.8	.8	1.4	1.0	1.2	.9	.75	.7	.7
7	.9	.8	.8	.7	.8	1.3	1.1	1.1	1.05	.8	.65	.7
8	.8	.9	.8	.7	.9	1.3	1.1	1.1	.85	.75	.7	.7
9	.9	.8	.9	.8	.9	1.3	1.2	1.1	1.0	.8	.7	.7
10	.8	.8	.8	.8	1.0	1.4	1.1	1.1	1.0	.75	.7	.7
11	.9	.8	.8	.9	1.0	1.5	1.2	1.1	.9	.7	.7	.7
12	.9	.9	.8	1.0	1.0	1.5	1.2	1.1	.8	.8	.7	.7
13	.9	.8	.8	.9	1.0	1.4	1.3	1.1	.85	.8	.7	.7
14	.9	.8	.8	.8	1.0	1.3	1.2	1.1	.8	.7	.7	.65
15	1.0	.8	.7	.8	1.0	1.3	1.2	1.1	.9	.85	.7	.65
16	.9	.9	.7	.7	1.0	1.2	1.2	1.1	.9	.8	.7	.65
17	1.0	.9	.8	.8	1.0	1.2	1.2	1.1	.9	.75	.7	.65
18	.9	.8	.9	.9	1.0	1.2	1.75	1.1	.85	.7	.7	.65
19	.9	.9	.8	.8	1.0	1.2	1.7	1.1	.8	.7	.7	.65
20	.8	.8	.8	.9	1.0	1.2	1.5	1.1	.8	.7	.7	.65
21	.9	.8	.8	.8	1.0	1.1	1.7	1.0	.8	.7	.7	.65
22	.9	.8	.8	.9	1.0	1.1	1.4	1.1	.8	.75	.7	.65
23	.8	.8	.8	.8	1.1	1.1	1.4	1.05	.8	.7	.7	.65
24	.9	.9	.9	.8	1.2	1.1	1.3	1.11	.8	.7	.7	.65
25	.9	.8	.8	.9	1.2	1.2	1.4	1.0	.8	.7	.7	.8
26	.8	.9	.8	.8	1.2	1.2	1.2	1.1	.8	.75	.7	.75
27	.9	.8	.8	.8	1.2	1.3	1.3	1.15	.8	.7	.7	.8
28	.9	.9	.8	.7	1.3	1.2	1.2	1.2	.8	.7	.7	.8
29	.8	.....	.7	.8	1.4	1.3	1.3	1.0	.8	.7	.7	.85
30	.9	.....	.7	.8	1.5	1.2	1.2	1.05	.8	.75	.7	.9
31	.9	.....	.7	.....	1.7	.....	1.3	1.05	.....	.7	.....	.85

Daily discharge, in second-feet, of Tinemaha Creek near Tinemaha, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	22.4	7.6	10.9	4.3	9.7	45	27.8	19.8	14.4	7.0	5.1	5.0
2	14.5	10.9	7.6	4.2	6.6	45	23.2	19.8	12.5	7.0	5.1	5.6
3	10.9	14.5	10.9	4.2	6.6	39.4	23.2	19.8	14.5	5.6	5.2	5.6
4	7.6	10.9	10.9	4.2	6.6	39.4	18.8	24.0	7.7	7.0	5.2	6.3
5	7.6	10.9	7.6	4.2	6.7	34.8	19.0	15.7	12.8	7.0	3.9	6.3
6	7.6	7.6	7.6	6.8	6.7	30.3	15.0	19.8	9.4	5.6	5.2	4.9
7	10.9	7.6	7.6	4.2	6.7	25.8	19.2	15.7	14.7	7.0	3.9	4.9
8	7.6	10.9	7.6	4.2	9.8	25.8	19.3	15.7	7.8	5.6	5.3	4.9
9	10.9	7.6	10.8	6.8	9.8	25.8	23.6	15.7	13.0	7.0	5.3	4.9
10	7.6	7.6	7.6	6.8	13.3	30.5	19.6	15.7	13.0	5.7	5.3	4.8
11	10.9	7.6	7.6	9.8	13.3	35.2	23.8	15.7	9.6	4.4	5.4	4.8
12	10.9	10.9	7.4	13.3	13.3	35.2	24.0	15.7	6.5	7.1	5.4	4.8
13	10.9	7.6	7.4	9.8	13.4	30.6	28.4	15.7	8.0	7.1	5.4	4.8
14	10.9	7.6	7.4	6.7	13.4	26.2	23.7	15.7	6.7	4.5	5.5	3.5
15	14.5	7.6	4.6	6.7	13.4	26.2	23.6	15.7	9.8	8.2	5.5	3.5
16	10.9	10.9	4.6	4.1	13.5	22.0	23.4	15.7	9.8	7.3	5.5	3.5
17	14.5	10.9	7.4	6.7	13.5	22.0	23.2	15.7	9.8	5.9	5.5	3.4
18	10.9	7.6	10.6	9.8	13.5	22.0	48.6	15.7	8.3	4.6	5.5	3.4
19	10.9	10.9	7.2	6.6	13.5	22.0	46.4	15.7	6.8	4.7	5.4	3.4
20	7.6	7.6	7.2	9.7	13.6	22.0	35.6	15.7	6.8	4.7	5.4	3.4
21	10.9	7.6	7.2	6.6	13.6	18.0	45.0	12.0	6.8	4.7	5.3	3.4
22	10.9	7.6	7.2	9.6	13.6	18.0	30.3	15.7	6.9	6.1	5.3	3.4
23	7.6	7.6	7.2	6.5	17.5	18.0	29.8	13.7	6.9	4.7	5.3	3.4
24	10.9	10.9	10.4	6.5	21.6	18.0	25.2	15.7	6.9	4.8	5.2	3.4
25	10.9	7.6	7.0	9.7	21.6	22.2	29.5	12.1	6.9	4.8	5.2	7.0
26	7.6	10.9	7.0	6.5	21.6	22.2	20.7	15.8	7.0	6.2	5.2	5.6
27	10.9	7.6	7.0	6.5	21.6	27.0	24.8	17.9	7.0	4.9	5.2	7.0
28	10.9	10.9	7.0	4.0	25.8	22.4	20.4	20.0	7.0	4.9	5.1	7.0
29	7.6	.....	4.3	6.6	30.3	27.4	24.6	12.3	7.0	5.0	5.1	8.6
30	10.9	.....	4.3	6.6	34.8	22.8	20.2	14.3	7.0	6.4	5.1	10.2
31	10.9	.....	4.3	.....	45	.....	24.4	14.3	.....	5.0	.....	8.6

NOTE.—Daily discharge determined by indirect method for shifting channels.

Monthly discharge of Tinemaha Creek near Tinemaha, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	22.4	7.6	10.7	658	C.
February	14.5	7.6	9.14	508	C.
March	10.9	4.3	7.53	463	C.
April	13.3	4.0	6.74	401	C.
May	45	6.6	15.6	959	B.
June	45	18	27.4	1,630	B.
July	48.6	15	25.9	1,590	B.
August	24.0	12.0	16.2	996	B.
September	14.7	6.5	9.04	538	C.
October	8.2	4.4	5.82	358	C.
November	5.5	3.9	5.20	309	C.
December	10.2	3.4	5.10	314	C.
The year	48.6	3.4	12.1	8,720	

TABOOSE CREEK NEAR ABERDEEN,[1] CAL.

This station, which is located at a point on the crossing of the upper main highway about 4 miles northwest of Aberdeen, in sec. 16, T. 11 S., R. 34 E., Mount Diablo base and meridian, was established August 20, 1906, about one-half mile west of the point of crossing of the lower main highway 2 miles northwest of Aberdeen railway station and about 15 miles north of Independence. It was removed to the present site on February 25, 1907. Discharge measurements had been made at the original site from the first of 1906.

[1] Formerly known as Tibbetts.

No water is diverted above or near the station. The drainage area above the mouth of the canyon is about 7 square miles.

The gage is a vertical staff on the left bank. On March 7, 1910, its datum was lowered 1 foot. All gage heights for 1910 are referred to the new datum.

The channel is composed of shifting sand.

The estimates of daily discharge for 1910 were prepared by the indirect method for shifting channels and from rating curves covering short periods of time.

Discharge measurements of Taboose Creek near Aberdeen, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 7	R. E. Haines	6.5	3.0	0.90	2.2
28	do	6.5	3.4	.95	3.6
Apr. 23	do	6.9	4.1	1.05	4.7
May 9	do	7.0	4.4	1.16	5.3
June 23	C. H. Lee	7.0	4.8	1.11	9.0
July 13	do	7.0	5.4	1.19	11
Aug. 1	do	7.0	4.2	1.10	8.3
22	F. G. Wood	7.0	4.4	.98	5.8
Sept. 16	G. T. Peekema	6.6	3.1	.81	3.8
Oct. 20	do	6.8	3.1	.86	2.9
Nov. 16	do	6.1	2.6	.79	3.0
Dec. 19	do	6.4	2.8	.79	3.0

NOTE.—All gage heights refer to datum 1 foot lower than that previously maintained.

Daily gage height, in feet, of Taboose Creek near Aberdeen, Cal., for 1910.

[Ray Bowers, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				0.95				1.2				
2					1.1				0.9			0.8
3	0.95					1.35	1.15			0.8		
4		0.9	0.9	.95							0.8	
5								1.1	.85			.8
6					1.1	1.4						
7	1.9	.9	1.0				1.1			.8	.8	
8				.95				1.1				
9					1.15				.8			.8
10	.95					1.25				.8		
11		.9	1.0	1.00			1.15				.8	
12								1.05	.8			.8
13					1.1	1.3						
14	.95	.9	1.0							.9	.8	
15				.98			1.2	1.0				
16					1.2				.8			.8
17	.95					1.2				.85		
18		.95	1.0	.98			1.2				.8	
19								.95	.8			.8
20					1.15	1.2						
21	.9	.9	1.0							.9	.8	
22				1.00			1.3	1.0				
23					1.25				.8			.8
24	.9					1.15				.85		
25		.9	1.0	1.10			1.2				.8	
26								.95	.8			.8
27					1.25	1.2						
28	.9	.9	.95							.8	.8	
29				1.10			1.2	.95				
30						1.2			.8			.8
31	.9				1.4					.8		

NOTE.—Gage datum lowered 1 foot Mar. 7. All gage heights for 1910 are referred to new datum.

Daily discharge, in second-feet, of Taboose Creek near Aberdeen, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3	2	2	3	5	15	11	11	4	3	3	3
2	3	2	2	3	5	14	10	11	4	3	3	3
3	3	2	2	3	5	13	10	10	4	3	3	3
4	5	2	2	3	5	14	10	9	4	3	3	3
5	10	2	3	3	4	14	9	8	4	3	3	3
6	15	2	3	3	4	15	8	8	4	3	3	3
7	30	2	4	3	4	14	8	8	4	3	3	3
8	15	2	4	3	5	13	8	8	3	3	3	3
9	5	2	4	3	5	12	9	8	3	3	3	3
10	3	2	4	4	5	11	10	8	3	3	3	3
11	3	2	4	4	5	11	10	7	3	3	3	3
12	3	2	4	4	5	12	10	7	3	3	3	3
13	3	2	4	4	5	13	11	7	3	4	3	3
14	3	2	4	4	5	13	11	6	3	4	3	3
15	3	2	4	4	6	12	11	6	3	4	3	3
16	3	2	4	4	7	11	11	6	3	4	3	3
17	3	3	4	4	7	11	11	6	3	4	3	3
18	3	3	4	4	7	11	11	6	3	4	3	3
19	3	3	4	4	6	11	11	6	3	3	3	3
20	2	2	4	4	6	11	12	6	3	3	3	3
21	2	2	4	4	7	10	13	6	3	4	3	3
22	2	2	4	4	8	10	14	6	3	4	3	3
23	2	2	4	5	9	9	13	6	3	4	3	3
24	2	2	4	5	9	10	12	6	3	4	3	3
25	2	2	4	5	9	10	11	6	3	4	3	3
26	2	2	4	5	10	11	11	6	3	3	3	3
27	2	2	3	5	10	11	11	6	3	3	3	3
28	2	2	3	5	11	11	11	6	3	3	3	3
29	2	.....	3	5	12	11	11	6	3	3	3	3
30	2	.....	3	5	13	11	11	5	3	3	3	3
31	2	.....	3	.....	15	.....	11	5	.....	3	.....	3

NOTE.—Daily discharges determined as follows: Jan. 1 to Apr. 24, from a poorly defined discharge rating curve; Apr. 25 to June 22, by indirect method for shifting channels; June 23 to Dec. 31, from a fairly well defined curve; discharge interpolated for days on which gage was not read.

Monthly discharge of Taboose Creek near Aberdeen, Cal., for 1910.

[Drainage area, 13.9 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	30	2	4.61	0.332	0.38	3.1
February	3	2	2.11	.152	.16	3.1
March	4	2	3.52	.253	.29	3.1
April	5	3	3.97	.286	.32	3.1
May	15	4	7.06	.508	.59	3.1
June	15	9	11.8	.849	.95	3.1
July	14	8	10.7	.770	.89	3.1
August	11	5	6.97	.501	.58	3.1
September	4	3	3.23	.232	.26	
October	4	3	3.35	.241	.28	
November	3	3	3.0	.216	.24	
December	3	3	3.0	.216	.25	
The year	30	2	5.30	.381	5.19	

NOTE.—Estimates only approximate. It has been stated that about half the discharge Creek at the mouth of the canyon is lost by seepage between the canyon and the gaging sta discharge per square mile and run-off depth in inches do not apply uniformly to the basin a

GOODALE CREEK NEAR ABERDEEN,[1] CAL.

This station, which is located at the point where the stream leaves the foothills, about 13 miles north of Independence, 4 miles west of Aberdeen railway station, and one-fourth mile west of the upper road crossing in sec. 16, T. 11 S., R. 34 E., Mount Diablo base and meridian, was established September 20, 1906.

No water is diverted above or near the station. The drainage area above the mouth of Goodale Creek canyon is about 5 square miles.

The gage is a vertical staff on the left bank. On March 7, 1910, the datum was lowered 1 foot; all gage heights for 1910 are referred to the new datum.

Discharge measurements are made from the footbridge at the gage.

The channel is composed of sand and shifts somewhat. There is but one channel at all stages and the current is swift.

The two discharge rating curves used for 1910 are fairly well defined and the record may be considered fairly good.

Discharge measurements of Goodale Creek near Aberdeen, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 7	R. E. Haines	6.2	2.8	1.10	4.0
28	do	5.2	3.2	1.02	3.3
Apr. 23	do	5.6	3.8	1.18	6.0
May 9	do	5.9	4.0	1.19	6.8
June 23	C. H. Lee	6.0	3.6	1.20	8.5
July 13	do	5.5	3.4	1.20	9.5
Aug. 1	Lee and Wood	5.8	3.0	1.10	5.5
22	F. G. Wood	5.3	2.3	1.02	4.1
Sept. 16	G. T. Peekema	5.5	2.4	.99	3.7
Oct. 20	do	5.4	2.2	.97	3.2
Nov. 16	do	5.4	2.2	.95	3.1
Dec. 19	do	5.7	2.2	.94	2.9

NOTE.—All gage heights refer to a datum 1 foot lower than that previously maintained.

Daily gage height, in feet, of Goodale Creek near Aberdeen, Cal., for 1910.

[Ray Bowers, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
15				1.0				1.1				
16					1.2				1.0			0.95
17	1.1					1.3	1.15			1.0		
18		1.0	1.05	1.0							0.95	
19								1.1	1.0			.95
20					1.15	1.3						
21	1.2	1.0	1.1				1.1			1.0	.95	
22				1.0				1.1				
23					1.15				.95			.95
24	1.05					1.25				1.0		
25		1.0	1.1	1.05			1.2				.95	
26								1.05	1.0			.95
27					1.2	1.3	1.2					
28	1.05	1.0	1.1							1.0	.95	
29				1.05			1.2	1.05				
30												
31												

[1] Formerly known as Tibbetts.

NOTE.—Gag

Daily gage height, in feet, of Goodale Creek near Aberdeen, Cal., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16					1.25				1.0		.95	.95
17	1.0					1.2				1.0		
18		1.0	1.1	1.1			1.2				.95	
19								1.0	1.0			.95
20					1.2	1.2				.97		
21	1.0	1.0	1.1							1.0	.95	
22				1.15			1.2	1.0				
23				1.18	1.25	1.2			1.0			.95
24	1.0					1.2				.95		
25		1.0	1.0	1.2			1.15				.95	
26								1.0	1.0			.95
27					1.25	1.2						
28	1.0	1.0	1.0								.95	
29				1.2			1.15	1.0		.95		
30						1.2			1.0			.95
31	1.0				1.3					.95		

NOTE.—Gage datum lowered 1 foot on Mar. 7. All 1910 gage heights refer to new datum.

Daily discharge, in second-feet, of Goodale Creek near Aberdeen, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.2	3.1	3.2	3.1	6.9	13.5	8.4	5.6	3.7	3.7	3.1	3.1
2	4.2	3.1	3.3	3.1	6.9	13.5	7.9	5.6	3.7	3.7	3.1	3.1
3	4.2	3.1	3.5	3.1	6.6	13.5	7.3	5.6	3.7	3.7	3.1	3.1
4	4.9	3.1	3.6	3.1	6.2	13.5	6.9	5.6	3.7	3.7	3.1	3.1
5	5.6	3.1	3.8	3.1	5.9	13.5	6.4	5.6	3.7	3.7	3.1	3.1
6	6.2	3.1	4.0	3.1	5.6	13.5	6.0	5.6	3.6	3.7	3.1	3.1
7	6.9	3.1	4.2	3.1	5.6	12.9	5.6	5.6	3.4	3.7	3.1	3.1
8	5.8	3.1	4.2	3.1	5.6	12.4	6.4	5.6	3.2	3.7	3.1	3.1
9	4.7	3.1	4.2	3.3	5.6	11.8	7.3	5.6	3.1	3.7	3.1	3.1
10	3.6	3.1	4.2	3.5	5.9	11.2	8.2	5.2	3.3	3.7	3.1	3.1
11	3.6	3.1	4.2	3.6	6.2	12.0	9.0	4.9	3.5	3.7	3.1	3.1
12	3.6	3.1	4.2	3.6	6.6	12.7	9.0	4.6	3.7	3.7	3.1	3.1
13	3.6	3.1	4.2	3.6	6.9	13.5	9.0	4.6	3.7	3.7	3.1	3.1
14	3.6	3.1	4.2	3.6	7.9	12.4	9.0	4.6	3.7	3.7	3.1	3.1
15	3.4	3.1	4.2	3.6	8.9	11.3	9.0	4.6	3.7	3.7	3.1	3.1
16	3.2	3.1	4.2	3.8	10 0	10.2	9.0	4.3	3.7	3.7	3.1	3.1
17	3.1	3.1	4.2	4.0	9.2	9.0	9.0	4.1	3.7	3.7	3.1	3.1
18	3.1	3.1	4.2	4.2	8.4	9.0	9.0	3.9	3.7	3.6	3.1	3.1
19	3.1	3.1	4.2	4.6	7.7	9.0	9.0	3.7	3.7	3.4	3.1	3.1
20	3.1	3.1	4.2	4.9	6.9	9.0	9.0	3.7	3.7	3.3	3.1	3.1
21	3.1	3.1	4.2	5.2	7.9	9.0	9.0	3.7	3.7	3.7	3.1	3.1
22	3.1	3.1	3.9	5.6	8.9	9.0	9.0	3.7	3.7	3.5	3.1	3.1
23	3.1	3.1	3.6	6.4	10.0	9.0	8.4	3.7	3.7	3.3	3.1	3.1
24	3.1	3.1	3.4	6.6	10.0	9.0	7.9	3.7	3.7	3.1	3.1	3.1
25	3.1	3.1	3.1	6.9	10.0	9.0	7.3	3.7	3.7	3.1	3.1	3.1
26	3.1	3.1	3.1	6.9	10.0	9.0	7.3	3.7	3.7	3.1	3.1	3.1
27	3.1	3.1	3.1	6.9	10.0	9.0	7.3	3.7	3.7	3.1	3.1	3.1
28	3.1	3.1	3.1	6.9	10.9	9.0	7.3	3.7	3.7	3.1	3.1	3.1
29	3.1	.....	3.1	6.9	11.8	9.0	7.3	3.7	3.7	3.1	3.1	3.1
30	3.1	.....	3.1	6.9	12.6	9.0	6.7	3.7	3.7	3.1	3.1	3.1
31	3.1	.....	3.1	.....	13.5	.....	6.2	3.7	.....	3.1	.....	3.1

NOTE.—Daily discharge determined from two fairly well-defined discharge rating curves, one applicable Jan. 1 to May 30 and the other June 1 to Dec. 31. Discharge interpolated for days on which gage was not read.

Monthly discharge of Goodale Creek near Aberdeen, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	6.9	3.1	3.80	234	B.
February	3.1	3.1	3.10	172	B.
March	4.2	3.1	3.77	232	B.
April	6.9	3.1	4.54	271	B.
May	13.5	5.6	8.02	493	B.
June	13.5	9.0	10.9	649	B.
July	9.0	5.6	7.87	484	B.
August	5.6	3.7	4.49	276	B.
September	3.7	3.1	3.63	216	B.
October	3.7	3.1	3.50	215	B.
November	3.1	3.1	3.10	184	B.
December	3.1	3.1	3.10	191	B.
The year	13.5	3.1	4.99	3,620	

DIVISION CREEK NEAR INDEPENDENCE, CAL.

This station, which is located at a point about 200 feet above the lower intake of the power canal of the Los Angeles Aqueduct, in secs. 4 and 5, T. 12 S., R. 34 E., Mount Diablo base and meridian, was originally established January 10, 1906, at a point on the upper road crossing, about 1½ miles west of the Rickey ranch house and about 10 miles north of Independence, and was removed to its present site May 9, 1908.

When the upper aqueduct power plant was put into operation in April, 1909, gage-height observations were discontinued on account of the variable amount of water diverted, and discharge measurements were made during periods of steady load.

Discharge measurements of Division Creek near Independence, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Discharge.
		Feet.	*Sq. ft.*	*Sec.-ft.*
Feb. 24	R. E. Haines	6.1	5.5	9.5
Mar. 16	do			[a] 7.7
Apr. 6	do	6.0	5.1	8.8
27	do	6.0	4.9	8.2
May 18	do	6.0	5.5	9.0
June 26 [b]	C. H. Lee	5.5	4.6	7.1
July 13 [b]	do	5.5	3.9	6.8
Aug. 1 [b]	Lee and Wood	5.5	4.0	6.9
25 [b]	F. G. Wood	5.8	4.6	7.6
Sept. 16	G. T. Peekema	5.9	4.2	6.9
Oct. 20 [c]	do	7.5	3.9	7.2
Nov. 16 [d]	do	6.0	5.6	9.1
Dec. 30 [e]	do	7.0	3.3	5.6

[a] Owing to change in load at power house 2.6 second-feet had to be added to measurement. The 7.7 second-feet represents normal conditions on this date.
[b] Made at Los Angeles Aqueduct power house No. 2.
[c] Made by wading 300 feet below power plant No. 1; plant running.
[d] Made 100 feet below power plant No. 2; plant running.
[e] Made at road crossing near lower power house; plant running.

SAWMILL CREEK[1] NEAR INDEPENDENCE, CAL.

This station, which is located at a point on the upper road crossing about 300 feet beyond the Eightmile ranch and about 8 miles north of Independence, in sec. 9, T. 12 S., R. 34 E., Mount Diablo base and meridian, and above all diversions, was established September 20, 1906.

The gage was destroyed in the early part of 1907 and was not replaced.

The following discharge measurements were made during 1910:

Discharge measurements of Sawmill Creek near Independence, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Discharge.
		Feet.	*Sq. ft.*	*Sec.-ft.*
Feb. 24[a]	R. E. Haines	6.0	3.6	6.1
Mar. 16	do	7.0	3.6	6.6
Apr. 6[a]	do	4.4	3.0	4.5
27	do	6.0	3.6	5.7
May 18	do	6.0	3.2	5.5
July 14	F. G. Wood	6.5	3.2	5.8
Aug. 12	do	6.0	2.8	4.2
Sept. 6	do	6.0	2.8	4.9
Oct. 10[b]	G. T. Peekema	5.4	3.8	4.6
Nov. 11[c]	do	4.0	2.7	5.0
Dec. 9[c]	do	4.3	2.6	4.2
30[c]	do	4.5	2.7	4.3

[a] Made near mouth of canyon.
[b] Made ½ mile below mouth of canyon.
[c] Made 2 miles above Eightmile ranch.

NOTE.—Except as indicated, all measurements were made at regular location.

OAK CREEK NEAR INDEPENDENCE, CAL.

This station, which is located above and about three-fourths of a mile west of Bell's flour mill in sec. 2, T. 13 S., R. 34 E., Mount Diablo base and meridian, was originally established June 15, 1905, about 1 mile west of Old Fort Independence. On October 1, 1906, the station was removed to Bell's flour mill, about 4 miles northwest of Independence, and this site was in turn abandoned, in favor of that now in use, on April 19, 1907.

No water is diverted above or near the station. The drainage area above the mouth of the canyon is approximately 15.4 square miles.

The gage is a vertical staff on the right bank.

Discharge measurements are made from the footbridge at the gage.

The channel is composed of sand and gravel and shifts somewhat.

The 1910 rating curve is fairly well defined and the record may be considered fairly good.

[1] Called Eightmile Creek in the 1906 report.

Discharge measurements of Oak Creek near Independence, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 26	R. E. Haines	14	9.7	0.61	11
Mar. 17	do	15	9.9	.61	11
Apr. 7	do	15	11	.64	11
28	do	16	14	.84	24
May 19	do	15	13	.85	25
June 22	C. H. Lee	16	14	.88	26
July 14	do	16	14	.83	23
19	do	16	17	1.03	49
Aug. 8	do	16	12	.71	14
Sept. 7	F. G. Wood	15	9.3	.61	11
28	G. T. Peckema	15	8.9	.57	7.6
Oct. 12	do	15	9.3	.60	8.7
Nov. 10	do	15	8.5	.58	7.2
Dec. 8	do	15	9.3	.58	8.0

Daily gage height, in feet, of Oak Creek near Independence, Cal., for 1910.

[A. N. Bell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						1.08			0.62		0.60	
2		0.65	0.60	0.63			0.90	0.80				
3	0.65				0.80				.62		.58	0.60
4		.65	.60	.63		1.02		.79		0.56		
5	.65			.63	.75		.89		.61		.60	.60
6		.65	.65			.92		.75		.55		
7	.65			.65	.78		.90		.60			.57
8					.79			.71		.58	.60	
9	.65	.65	.65	.68		.95	.82		.59			
10					.87			.70			.58	.60
11	.65	.65	.65	.70		.98				.59		
12					.83		.89	.70	.58		.60	.58
13		.65								.60		
14	.65		.65	.70		.98		.69	.58			.54
15		.60			.90		.82			.62	.60	
16	.65		.63	.70		.95			.60	.60		
17			.61		.87	.90	.87	.68			.58	.52
18	.65	.60	.65	.71			1.15			.58		
19					.87			.65	.60		.60	.56
20		.60	.65	.73			1.05					
21	.65				.90	.85			.59	.58	.59	.52
22				.73		.88		.67				
23	.65	.60	.65			.87			.60	.58	.55	
24				.75	.93		.90	.65				.57
25		.60			.90	.85				.60		
26	.65	.61	.65	.82		.85	.85	.65	.58		.58	
27		.60			.95					.59		.58
28			.65	.84			.84		.60		.59	
29	.65			.82	1.00	.85						.55
30			.65				.82	.64	.58	.58	.56	
31	.65				1.05							.60

Daily discharge, in second-feet, of Oak Creek near Independence, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.2	12.2	10	11.7	22	58	28	22	9.7	7.5	8.7	7.6
2	12.2	12.2	10	11.4	21	55	30	21	9.7	7.4	8.3	8.1
3	12.2	12.2	10	11.4	21	51	30	20	9.7	7.2	7.9	8.7
4	12.2	12.2	10	11.4	19	48	29	20.3	9.4	7.1	8.3	8.7
5	12.2	12.2	11.1	11.4	17.4	40	29	18	9.2	6.9	8.7	8.7
6	12.2	12.2	12.2	11.8	18	33	29	17	9.0	6.7	8.7	8.1
7	12.2	12.2	12.2	12.2	19.6	34	30	16	8.7	7.3	8.7	7.5
8	12.2	12.2	12.2	12.9	20.3	36	27	14.6	8.5	7.9	8.7	7.9
9	12.2	12.2	12.2	13.6	24	37	23	14.2	8.3	8.0	8.3	8.3
10	12.2	12.2	12.2	14.0	27	39	25	13.9	8.2	8.1	7.9	8.7
11	12.2	12.2	12.2	14.5	26	41	27	13.9	8.1	8.3	8.3	8.3
12	12.2	12.2	12.2	14.5	24	41	29	13.9	7.9	8.5	8.7	7.9
13	12.2	12.2	12.2	14.5	26	41	27	13.6	7.9	8.7	8.7	7.1
14	12.2	11.1	12.2	14.5	28	41	25	13.4	7.9	9.2	8.7	6.3
15	12.2	10	11.8	14.5	30	39	23	13.2	8.3	9.7	8.7	6.0
16	12.2	10	11.4	14.5	28	37	25	13.0	8.7	8.7	8.3	5.7
17	12.2	10	10.4	14.8	27	30	27	12.9	8.7	8.3	7.9	5.5
18	12.2	10	12.2	15.2	27	29	74	12.1	8.7	7.9	8.3	6.3
19	12.2	10	12.2	15.8	27	28	64	11.3	8.7	7.9	8.7	7.1
20	12.2	10	12.2	16.4	28	27	53	11.6	8.5	7.9	8.5	6.3
21	12.2	10	12.2	16.4	30	26	47	12.0	8.3	7.9	8.3	5.5
22	12.2	10	12.2	16.4	31	28	41	12.3	8.5	7.9	7.5	6.2
23	12.2	10	12.2	17.1	33	27	35	11.8	8.7	7.9	6.7	6.8
24	12.2	10	12.2	17.8	34	26	30	11.3	8.4	8.3	7.1	7.5
25	12.2	10	12.2	20.4	30	26	28	11.3	8.1	8.7	7.5	7.6
26	12.2	10.4	12.2	23	34	26	26	11.3	7.9	8.5	7.9	7.8
27	12.2	10	12.2	24	37	26	25	11.2	8.3	8.3	8.1	7.9
28	12.2	10	12.2	25	40	26	25	11.1	8.7	8.1	8.3	7.3
29	12.2	.....	12.2	23	44	26	24	11.0	8.3	8.0	7.7	6.7
30	12.2	.....	12.2	22	48	26	23	10.8	7.9	7.9	7.1	7.7
31	12.2	.....	11.9	.....	53	.....	22	10.2	.....	8.3	.....	8.7

NOTE.—Daily discharge determined from two fairly well-defined discharge rating curves, one applicable Jan. 1 to Apr. 26, and the other Apr. 28 to Dec. 31. Discharge interpolated for days on which gage was not read.

Monthly discharge of Oak Creek near Independence, Cal., for 1910.

[Drainage area, 26.9 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	12.2	12.2	12.2	0.454	0.52	750	B.
February	12.2	10.0	11.1	.413	.43	616	B.
March	12.2	10.0	11.8	.439	.51	726	B.
April	25	11.4	16.3	.606	.68	970	B.
May	53	17.4	28.8	1.07	1.23	1,770	B.
June	58	26	34.9	1.30	1.45	2,080	B.
July	74	22	31.6	1.18	1.36	1,940	B.
August	22	10.2	13.9	.517	.60	855	B.
September	9.7	7.9	8.56	.318	.35	509	B.
October	9.7	6.7	8.03	.299	.34	494	B.
November	8.7	6.7	8.17	.304	.34	486	B.
December	8.7	5.5	7.37	.273	.31	453	B.
The year	74	5.5	16.1	.596	8.12	11,600	

LITTLE PINE CREEK[1] NEAR INDEPENDENCE, CAL.

This station, which is located about 300 feet above the city waterworks and 1 mile west of Independence, in sec. 18, T. 13 S., R. 35 E., Mount Diablo base and meridian, was established August 20, 1906, replacing the station at the city waterworks which was established June 15, 1905, and destroyed in June, 1906.

No water is diverted above the gage. The town of Independence diverts about 0.5 second-foot of water 100 feet below the station. The drainage area above the mouth of the canyon is approximately 8.4 square miles.

The gage is a vertical staff on the left bank at the footbridge from which discharge measurements are made.

Both banks are high and rocky and not likely to overflow. The bed of the stream is rough and the current is swift. The channel, which is composed of bowlders and gravel, shifts somewhat.

The discharge rating curves for 1910 are well defined and the records may be considered good.

Discharge measurements of Little Pine Creek near Independence, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 26	R. E. Haines	10	5.4	0.18	4.6
Mar. 18	do	12	6.2	.25	6.2
Apr. 8	do	12	6.6	.27	6.7
29	do	12	10	.53	22
May 20	do	12	12	.68	32
June 21	C. H. Lee	12	12	.68	32
July 14	do	13	11	.65	25
18	do	13	17	1.10	71
Aug. 8	do	12	9	.51	15
Sept. 7	F. G. Wood	11	6.1	.33	6.8
28	G. T. Peekema	12	5.6	.28	4.9
Oct. 19	do	12	6.4	.29	5.8
Nov. 12	do	12	6.2	.28	4.9
Dec. 8	do	12	6.0	.25	4.0

[1] Locally known as Independence Creek.

Daily gage height, in feet, of Little Pine Creek near Independence, Cal., for 1910.

[Le Roy Roeper, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.4		0.25		0.55		0.75		0.38	0.3		
2				0.25		0.95		0.6			0.25	0.25
3	.4	0.25	.25		.55		.75		.44	.25		
4				.25		.95		.6			.3	.25
5	.35	.3	.25		.55		.7		.36	.25		
6				.35		.95		.6			.3	.25
7	.35	.3	.25		.55		.55		.40	.25		
8				.35		.95		.51			.3	.25
9	.35	.25	.25		.6		.65		.32	.3		
10				.35		.95		.50			.25	.25
11	.35	.25	.25		.65		.65	.50	.32	.3		
12				.35		.95		.48			.25	.25
13	.35	.25	.25		.65		.65	.48	.30	.3		
14				.35		.95	.65				.3	.2
15	.35	.25	.25		.65		.65	.46	.40	.35		
16				.35		.85					.25	.25
17	.25	.3	.3		.65		.65		.32	.3		
18			.25	.35		.8	1.10	.44			.3	.25
19	.25	.25	.25		.65		1.0	.43	.33	.3		
20				.45	.68	.75					.25	.25
21	.25	.3	.25		.7	.68	.85		.29	.3		
22				.55		.7		.48			.3	.2
23	.25	.3	.25		.75		.85	.44	.31			
24				.55		.65				.3	.3	.25
25	.25	.3	.25		.8		.75		.28	.3		
26		.18		.55		.65					.25	.3
27	.25	.35	.25		.85		.75	.42	.30	.3		
28				.55		.75		.41	.28		.25	.2
29	.25		.25	.53	.85		.7		.26	.25		
30				.55		.8		.42			.25	.25
31	.25		.25		.9		.65			.3		

Daily discharge, in second-feet, of Little Pine Creek near Independence, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	13	6.5	6.5	6.5	22	54	38	23	8.7	5.5	4.8	4.0
2	13	6.5	6.5	6.5	22	56	38	21	10.1	4.8	4.0	4.0
3	13	6.5	6.5	6.5	22	56	38	21	11.5	4.0	4.8	4.0
4	12	7.2	6.5	6.5	22	56	36	21	9.7	4.0	5.5	4.0
5	10	8.0	6.5	8.0	22	56	34	21	7.9	4.0	5.5	4.0
6	10	8.0	6.5	10	22	56	28	21	8.7	4.0	5.5	4.0
7	10	8.0	6.5	10	22	56	22	18	9.5	4.0	5.5	4.0
8	10	7.2	6.5	10	24	56	26	15	7.9	4.8	5.5	4.0
9	10	6.5	6.5	10	26	56	30	15	6.3	5.5	4.8	4.0
10	10	6.5	6.5	10	28	56	30	14.5	6.3	5.5	4.0	4.0
11	10	6.5	6.5	10	30	56	30	14.5	6.3	5.5	4.0	4.0
12	10	6.5	6.5	10	30	56	30	13.5	5.9	5.5	4.0	4.0
13	10	6.5	6.5	10	30	56	30	13.5	5.5	5.5	4.8	3.2
14	10	6.5	6.5	10	30	56	30	13.0	7.5	6.5	5.5	2.5
15	10	6.5	6.5	10	30	52	30	12.5	9.5	7.5	4.8	3.2
16	8	7.2	7.2	10	30	48	30	12.2	7.9	6.5	4.0	4.0
17	6.5	8.0	8.0	10	30	45	30	11.8	6.3	5.5	4.8	4.0
18	6.5	7.2	6.5	10	30	43	71	11.5	6.5	5.5	5.5	4.0
19	6.5	6.5	6.5	13	30	41	59	11.0	6.7	5.5	4.8	4.0
20	6.5	7.2	6.5	16	32	38	52	11.8	6.0	5.5	4.0	4.0
21	6.5	8.0	6.5	19	34	32	44	12.7	5.2	5.5	4.8	3.2
22	6.5	8.0	6.5	22	36	34	44	13.5	5.6	5.5	5.5	2.5
23	6.5	8.0	6.5	22	38	32	44	11.5	5.9	5.5	5.5	3.2
24	6.5	8.0	6.5	22	41	30	39	11.2	5.4	5.5	5.5	4.0
25	6.5	8.0	6.5	22	43	30	34	11.0	4.9	5.5	4.8	4.8
26	6.5	4.6	6.5	22	45	30	34	10.8	5.2	5.5	4.0	5.5
27	6.5	10.0	6.5	22	48	34	34	10.5	5.5	5.5	4.0	4.0
28	6.5	8.0	6.5	22	48	38	32	10.0	4.9	4.8	4.0	2.5
29	6.5		6.5	21	48	40	30	10.2	4.3	4.0	4.0	3.2
30	6.5		6.5	22	50	43	28	10.5	4.9	4.8	4.0	4.0
31	6.5		6.5		52		26	9.5		5.5		4.0

NOTE.—Daily discharge determined from two fairly well-defined discharge rating curves, one applicable from Jan. 1 to July 18, and the other from July 19 to Dec. 31. Discharge interpolated for days of missing gage heights.

Monthly discharge of Little Pine Creek near Independence, Cal., for 1910.

[Drainage area, 21.4 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	13	6.5	8.60	0.402	0.46	529	B.
February	10	4.6	7.22	.337	.35	401	B.
March	8	6.5	6.57	.307	.36	404	A.
April	22	6.5	13.6	.635	.71	809	A.
May	52	22	32.8	1.53	1.76	2,020	B.
June	56	30	46.4	2.17	2.42	2,760	B.
July	71	22	35.5	1.66	1.91	2,180	B.
August	23	9.5	14.1	.659	.76	867	A.
September	11.5	4.3	6.88	.321	.36	409	A.
October	7.5	4.0	5.25	.245	.28	323	A.
November	5.5	4.0	4.74	.221	.25	282	A.
December	5.5	2.5	3.80	.178	.21	234	A.
The year	71	2.5	15.5	.724	9.83	11,200	

SHEPARD CREEK NEAR THEBE, CAL.[1]

No regular gaging station has been maintained on Shepard Creek. All measurements were made at a point about 3 miles east of the mouth of the canyon, in sec. 9, T. 14 S., R. 35 E., Mount Diablo base and meridian, and above all diversions.

Discharge measurements of Shepard Creek near Thebe, Cal., in 1910.

Date.	Hydrographer.	North Branch discharge.	South Branch discharge.	Total Shepard Creek discharge.
		Sec.-ft.	*Sec.-ft.*	*Sec.-ft.*
Feb. 25	R. E. Haines	1.7	0	1.7
Mar. 15	do	2.1	0	2.1
Apr. 5	do	0	2.5	2.5
26	do	1.4	5.2	6.6
May 17	do	6.9	4.5	11.4
June 21	C. H. Lee	9.6	3.3	12.9
July 16	F. G. Wood	3.7	15.2	18.9
Aug. 11	do	3.6	8.6	12.2
29	G. T. Peekema	.8	7.2	8.0
Sept. 30	do	2.1	1.4	3.5
Oct. 31	do	2.0	1.8	3.8
Dec. 7	do	1.2	1.3	2.5

NOTE.—The discharge past the regular gaging station was determined by adding together the measured discharge of the North and South Branches. Measurements on these were made at several sections.

BAIRS CREEK[2] NEAR THEBE, CAL.

No regular gaging station has been maintained on Bairs Creek. All measurements were made at a point about 3 miles east of the mouth of the canyon, in sec. 16, T. 14 S., R. 35 E., Mount Diablo base and meridian, and above all diversions.

[1] Described in the 1906 report as near Independence. [2] Called Moffett Creek in the 1906 report.

Discharge measurements of Bairs Creek near Thebe, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Discharge.
		Feet.	*Sq. ft.*	*Sec.-ft.*
Feb. 25	R. E. Haines	1.9	1.3	0.14
Mar. 15	do	2.0	1.3	.26
Apr. 5	do	1.9	1.2	.12
26	do	5.5	3.6	1.9
May 17	do	8.0	7.0	8.6
June 21	C. H. Lee	5.6	4.1	4.8
July 16	do	6.2	3.4	3.3
Aug. 11	F. G. Wood	6.1	2.7	1.6
29	do	5.6	2.3	1.0
Sept. 30	G. T. Peckema	2.0	.95	.38
Oct. 31	do	2.2	.92	.35
Dec. 7	do	3.5	1.4	.61

NOTE.—Measurements made by wading at various sections.

GEORGE CREEK NEAR THEBE, CAL.[1]

A gage has been placed on George Creek at a point about 1 mile west of the road from Independence to Lone Pine, in sec. 27, T. 14 S., R. 35 E., Mount Diablo base and meridian.

No water is diverted above the gage.

No gage height record is available, but the following discharge measurements were made near the gage during 1910.

Discharge measurements of George Creek near Thebe, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 25	R. E. Haines	7.8	3.3	0.53	1.1
Mar. 15	do	7.8	4.5	.65	3.0
Apr. 5	do	7.9	4.1	.61	2.4
26	do	9.0	6.9	.94	11
May 17	do	10	8.2	1.00	16
June 21	C. H. Lee	9.0	7.4	1.00	13
July 16	F. G. Wood	9.0	7.0	.95	11
Aug. 11	do	9.0	5.8	.....	6.4
29	do	8.8	6.0	.76	5.6
Sept. 30	G. T. Peckema	8.8	4.7	.68	3.2
Oct. 31	do	9.0	5.4	.83	4.9
Dec. 7	do	8.5	4.2	.70	2.6

LONE PINE CREEK NEAR LONE PINE, CAL.

This station, which is located at a point about three-fourths of a mile west of the town of Lone Pine and about 500 feet above the division boxes on the creek, in sec. 29, T. 15 S., R. 36 E., Mount Diablo base and meridian, was established September 25, 1906.

No water is diverted above the station.

The gage is a vertical staff on the left bank at the footbridge, from which discharge measurements are made.

The drainage area above the mouth of the canyon is about 12 square miles.

[1] Described in the 1906 report as near Independence.

Both banks are high and rocky and not subject to overflow. The channel is composed of gravel and bowlders and shifts somewhat at high stages. The records may be considered good.

Discharge measurements of Lone Pine Creek near Lone Pine, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 2	R. E. Haines	7.2	6.3	1.90	5.5
22	do	7.2	6.8	1.94	6.5
Apr. 12	do	7.3	7.2	2.03	8.2
May 3	do	7.3	9.3	2.32	15
24	do	8.0	13	2.72	30
June 28	C. H. Lee	8.0	13	2.68	30
July 21	do	9.4	16	3.10	47
Aug. 16	F. G. Wood	7.8	10	2.50	18
Sept. 3	do	7.6	9.5	2.39	14
22	G. T. Peekema	7.9	10	2.42	15
Oct. 27	do	7.3	8.9	2.23	9.3
Nov. 30	do	7.2	6.8	2.01	5.8

Daily gage height, in feet, of Lone Pine Creek near Lone Pine, Cal., for 1910.

[S. A. Gallaher, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.0			1.9					2.35	2.2		
2			1.9			3.0	2.6	2.75				
3		2.1			2.3						2.1	2.0
4	2.0			1.9					2.35	2.2		
5			1.9			2.95	2.5	2.7				
6		2.1			2.35						2.05	2.0
7	2.0			2.0					2.3	2.2		
8			1.9			2.95	2.6	2.65				
9		2.1			2.35						2.0	2.0
10	1.9			2.0					2.2	2.1		
11			1.9			2.9	2.6	2.6				
12		2.2			2.5						2.0	2.0
13	1.9			2.05					2.2	2.35		
14			2.0			2.75	2.65	2.6				
15		2.1			2.5						2.0	2.0
16	1.9			2.05					2.75	2.2		
17			2.0			2.6	2.65	2.5				
18		1.9		2.1	2.6						2.0	2.1
19	1.9								2.6	2.2		
20			2.0			2.6		2.45				
21		1.9		2.2	2.65		3.05				2.0	2.1
22	2.0								2.45	2.2		
23			1.9			2.6		2.5				
24		1.9		2.3	2.65		2.95				2.0	2.1
25	1.9								2.3	2.25		
26			1.9			2.6		2.5				
27		1.9		2.4	2.65		3.0	2.5			2.0	2.0
28	1.9								2.25	2.3		
29			1.9			2.6	2.8	2.55				
30				2.3	3.1			2.55			2.0	2.0
31	1.9									2.2		

Daily discharge, in second-feet, of Lone Pine Creek near Lone Pine, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.5	7.0	5.8	5.8	15.0	44	26	30	12.8	8.7	8.0	5.5
2	7.5	8.2	5.8	5.8	15.0	42	26	29	12.8	8.7	7.4	5.5
3	7.5	9.5	5.8	5.8	15.0	41	25	28	12.8	8.7	6.8	5.5
4	7.5	9.5	5.8	5.8	15.6	40	23	27	12.8	8.7	6.6	5.5
5	7.5	9.5	5.8	6.3	16.2	40	22	26	12.2	8.7	6.4	5.5
6	7.5	9.5	5.8	6.9	16.8	40	23	25	11.6	8.7	6.2	5.5
7	7.5	9.5	5.8	7.5	16.8	40	25	25	11.0	8.7	5.9	5.5
8	6.9	9.5	5.8	7.5	16.8	40	26	24	10.2	8.0	5.7	5.5
9	6.3	9.5	5.8	7.5	16.8	39	26	23	9.4	7.4	5.5	5.5
10	5.8	10.3	5.8	7.5	18.5	39	26	23	8.7	6.8	5.5	5.5
11	5.8	11.1	5.8	7.8	20	38	26	22	8.7	8.8	5.5	5.5
12	5.8	12.0	6.3	8.1	22	36	27	22	8.7	10.8	5.5	5.5
13	5.8	11.1	6.9	8.5	22	34	27	22	8.7	12.8	5.5	5.5
14	5.8	10.3	7.5	8.5	22	32	28	22	15.4	11.4	5.5	5.5
15	5.8	9.5	7.5	8.5	22	30	28	21	22	10.0	5.5	5.5
16	5.8	8.2	7.5	8.5	23	28	28	19	29	8.7	5.5	5.9
17	5.8	7.0	7.5	9.0	25	26	28	18.0	26	8.7	5.5	6.3
18	5.8	5.8	7.5	9.5	26	26	32	17.4	24	8.7	5.5	6.8
19	5.8	5.8	7.5	10.3	26	26	36	16.8	22	8.7	5.5	6.8
20	6.3	5.8	7.5	11.1	28	26	40	16.2	20	8.7	5.5	6.8
21	6.9	5.8	6.9	12.0	28	26	45	16.8	18.1	8.7	5.5	6.8
22	7.5	5.8	6.3	13.0	28	26	43	17.4	16.2	8.7	5.5	6.8
23	6.9	5.8	5.8	14.0	28	26	41	18.0	14.4	9.0	5.5	6.8
24	6.3	5.8	5.8	15.0	28	26	39	18.0	12.7	9.4	5.5	6.8
25	5.8	5.8	5.8	16.2	28	26	40	18.0	11.0	9.8	5.5	6.3
26	5.8	5.8	5.8	17.3	28	26	41	18.0	10.6	10.2	5.5	5.9
27	5.8	5.8	5.8	18.5	28	26	42	18.0	10.2	10.6	5.5	5.5
28	5.8	5.8	5.8	17.3	34	26	37	19.0	9.8	11.0	5.5	5.5
29	5.8	.....	5.8	16.2	40	26	32	20	9.4	10.2	5.5	5.5
30	5.8	.....	5.8	15.0	47	26	31	20	9.0	9.4	5.5	5.5
31	5.8	.....	5.8	.....	45	.....	30	16.4	.....	8.7	.....	5.5

NOTE.—Daily discharge determined from two discharge rating curves both fairly well defined, one applicable from Jan. 1 to July 21 and the other from July 22 to Dec. 31. Discharge interpolated for days on which the gage was not read.

Monthly discharge of Lone Pine Creek near Lone Pine, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	7.5	5.8	6.39	393	C.
February	12.0	5.8	8.04	447	C.
March	7.5	5.8	6.29	387	B.
April	18.5	5.8	10.4	619	B.
May	47	15	24.5	1,510	B.
June	44	26	32.2	1,920	B.
July	45	22	31.3	1,920	B.
August	30	16.2	21.2	1,300	B.
September	29	8.7	14.0	833	B.
October	12.8	6.8	9.23	568	B.
November	8.0	5.5	5.80	345	B.
December	6.8	5.5	5.87	361	C.
The year	47	5.5	14.6	10,600	

TUTTLE CREEK NEAR LONE PINE, CAL.

This station, which is located about 2 miles southwest of Lone Pine, in sec. 32, T. 15 S., R. 36 E., Mount Diablo base and meridian, at the point where the stream leaves the foothills and enters the valley, was established January 1, 1906.

The gage is a vertical staff on the right bank at the footbridge 50 feet above the division box which controls the water diverted from this stream.

Discharge measurements are made from the footbridge.

The drainage area above the mouth of the canyon is approximately 7.8 square miles.

As the channel is continually shifting, the estimates for 1910 have been prepared by the indirect method. The record is rated as approximate.

Discharge measurements of Tuttle Creek near Lone Pine, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 2	R. E. Haines	9	4.2	1.10	5.5
22	do	9	4.2	1.09	5.3
Apr. 22	do	9	4.2	1.09	5.6
May 3	do	9	5.2	1.22	6.1
24	do	9	5.9	1.29	8.7
June 28	C. H. Lee	9	6.2	1.33	11
July 21	do	9	7.3	1.41	13
Aug. 16	F. G. Wood	9	5.6	1.32	8.8
Sept. 3	do	9	4.9	1.33	8.5
22	G. T. Peekema	9	6.6	1.33	10
Oct. 27	do	9	5.1	1.30	6.4
Nov. 30	do	9	4.7	1.29	6.8

Daily gage height, in feet, of Tuttle Creek near Lone Pine, Cal., for 1910.

[S. A. Gallaher, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.1			1.2					1.35	1.3		
2			1.1			1.4	1.3	1.4				
3		1.4			1.2						1.3	1.3
4	1.2			1.3					1.3	1.3		
5			1.1			1.4	1.3	1.4				
6		1.4			1.2						1.3	1.3
7	1.3			1.3					1.3	1.3		
8			1.0			1.4	1.3	1.35				
9		1.4			1.2						1.3	1.3
10	1.2			1.3					1.3	1.3		
11			1.0			1.4	1.3	1.35				
12		1.5			1.2						1.3	1.3
13	1.2			1.1					1.3	1.3		
14			1.1			1.4	1.35	1.35				
15		1.4			1.2						1.3	1.3
16	1.2			1.0					1.4	1.3		
17			1.1			1.35	1.35	1.3				
18		1.3		1.0	1.3						1.3	1.3
19	1.3								1.35	1.3		
20			1.2			1.35		1.3				
21		1.1		1.4	1.3		1.4				1.3	1.3
22	1.4								1.35	1.3		
23			1.2			1.3		1.3				
24		1.1		1.4	1.3		1.4				1.3	1.3
25	1.4								1.3	1.3		
26			1.1			1.3		1.3				
27		1.1		1.2	1.3		1.6				1.3	1.3
28	1.3								1.3	1.3		
29			1.2			1.3		1.3				
30				1.3	1.4		1.4				1.3	1.3
31	1.3									1.3		

Daily discharge, in second-feet, of Tuttle Creek near Lone Pine, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6	13	6	8	8	13	10	12	9	8	6	7
2	7	14	6	9	7	13	10	12	8	8	6	7
3	7	16	6	10	6	13	10	12	8	8	6	7
4	8	16	6	12	6	13	10	12	8	8	6	7
5	9	16	6	12	6	13	10	12	8	8	7	7
6	10	16	5	12	6	13	10	11	8	8	7	7
7	12	16	5	12	6	13	10	11	8	8	7	7
8	11	16	4	12	6	13	10	10	8	8	7	7
9	9	16	4	12	6	13	10	10	8	8	7	7
10	8	18	4	12	6	13	9	10	8	8	7	7
11	8	19	4	10	6	13	9	10	8	8	7	7
12	8	20	5	8	6	13	10	10	8	8	7	7
13	8	19	5	6	6	13	10	10	8	8	7	7
14	8	17	6	5	6	13	11	10	9	8	7	7
15	8	16	6	5	6	13	11	10	10	7	7	7
16	8	15	6	4	7	12	11	9	12	7	7	7
17	9	14	6	4	8	12	11	8	11	7	7	7
18	10	12	7	4	9	12	11	8	11	7	7	7
19	12	10	7	8	9	12	12	8	10	7	7	7
20	13	8	8	12	9	12	13	8	10	7	7	6
21	15	6	7	16	9	11	13	8	10	7	7	6
22	16	6	5	6	9	11	13	8	10	7	7	6
23	16	6	8	11	9	10	12	8	10	7	7	6
24	16	6	7	16	9	10	12	8	9	7	7	6
25	16	6	7	13	9	10	15	8	9	7	7	6
26	14	6	6	10	9	10	18	8	9	7	7	6
27	13	6	7	7	9	10	21	8	8	6	7	6
28	12	6	7	8	10	11	18	8	8	6	7	6
29	12	.....	8	8	12	10	15	8	8	6	7	6
30	12	.....	8	9	13	10	12	8	8	6	7	6
31	12	.....	8	.....	13	.....	12	8	.....	6	.....	6

NOTE.—Daily discharge determined by the indirect method for shifting channels. Discharge interpolated for days on which gage heights were not recorded.

Monthly discharge of Tuttle Creek near Lone Pine, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	16	6	10.7	658
February	20	6	12.7	705
March	8	4	6.13	377
April	16	4	8.97	534
May	13	6	7.94	488
June	13	10	11.9	708
July	21	9	11.9	732
August	12	8	9.39	577
September	12	8	8.90	530
October	8	6	7.29	448
November	7	6	6.87	409
December	7	6	6.61	406
The year	21	4	9.08	6,570

NOTE.—Estimates only approximate.

COTTONWOOD CREEK NEAR OLANCHA, CAL.

Cottonwood Creek discharges into Owens Lake.

The gaging station, which is located at a point 100 feet above the head of the diversion pipe of the Los Angeles Aqueduct, in sec. 21, T. 17 S., R. 36 E., Mount Diablo base and meridian, was established September 9, 1908, replacing the station established September 26, 1906, at a point about one-fourth mile above the crossing of the Los Angeles Aqueduct and about 15 miles south of Lone Pine.

No water is diverted above the station; just below the station the Los Angeles Aqueduct diverts water for the development of power. The drainage area above the mouth of the canyon is about 42 square miles.

The gage is a vertical staff on the right bank 500 feet below the footbridge from which discharge measurements are made.

The channel is composed of sand and gravel and is somewhat shifting. Both banks are high and rocky and the current is swift at all stages.

The discharge rating curve is fairly well defined and the record may be considered good.

Discharge measurements of Cottonwood Creek near Olancha, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 3	R. E. Haines	11	13	1.53	13
23	....do	11	15	1.80	22
Apr. 13	....do	15	19	2.00	30
May 4	....do	16	30	2.58	73
25	....do	17	32	2.50	67
June 29	C. H. Lee	15	21	1.85	27
July 22	Lee and Wood	15	18	1.79	20
Aug. 17	F. G. Wood	13	14	1.52	13
Sept. 2	....do	14	14	1.43	12
20	G. T. Peekema	16	16	1.57	15
Oct. 28	....do	15	16	1.50	14
Dec. 1	....do	17	16	1.41	11

Daily gage height, in feet, of Cottonwood Creek near Olancha, Cal., for 1910.

[Sam Robinson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.7	1.5	1.45	1.65	2.7	2.5	1.8	1.75	1.45	1.5	1.5	1.4
2	1.6	1.4	1.5	1.7	2.7	2.5	1.8	1.7	1.4	1.5	1.45	1.35
3	1.5	1.4	1.5	1.7	2.6	2.5	1.8	1.7	1.4	1.5	1.45	1.4
4	1.6	1.4	1.55	1.75	2.35	2.5	1.75	1.7	1.4	1.5	1.5	1.3
5	1.6	1.5	1.6	1.8	2.3	2.5	1.75	1.7	1.4	1.45	1.5	1.4
6	1.7	1.5	1.6	1.8	2.5	2.5	1.75	1.65	1.4	1.45	1.4	1.5
7	1.7	1.5	1.6	1.8	2.6	2.5	1.7	1.65	1.4	1.45	1.3	1.5
8	1.6	1.5	1.65	1.85	2.6	2.4	1.7	1.6	1.35	1.45	1.4	1.5
9	1.6	1.5	1.7	1.85	2.6	2.3	1.7	1.6	1.35	1.45	1.4	1.4
10	1.6	1.45	1.7	1.9	2.6	2.3	1.7	1.6	1.35	1.4	1.4	1.5
11	1.6	1.45	1.7	2.0	2.6	2.25	1.7	1.55	1.3	1.45	1.4	1.5
12	1.6	1.45	1.7	2.0	2.6	2.2	1.7	1.55	1.3	1.3	1.4	1.3
13	1.6	1.45	1.7	2.0	2.6	2.2	1.7	1.55	1.3	1.4	1.5	1.3
14	1.6	1.45	1.75	2.0	2.6	2.2	1.65	1.5	1.3	1.3	1.5	1.3
15	1.6	1.45	1.7	2.0	2.6	2.2	1.65	1.5	3.0	1.5	1.4	1.3
16	1.6	1.4	1.75	2.1	2.6	2.2	1.65	1.5	1.9	1.5	1.3	1.3
17	1.5	1.4	1.75	2.2	2.5	2.2	1.65	1.5	1.7	1.6	1.3	1.3
18	1.5	1.4	1.75	2.25	2.5	2.1	2.0	1.5	1.65	1.7	1.5	1.4
19	1.5	1.4	1.75	2.3	2.5	2.0	1.9	1.5	1.6	1.5	1.15	1.4
20	1.5	1.4	1.8	2.4	2.5	2.0	1.8	1.5	1.55	1.5	1.3	1.5
21	1.5	1.45	1.8	2.5	2.45	2.0	1.8	1.5	1.55	1.6	1.4	1.5
22	1.5	1.45	1.75	2.5	2.45	2.0	1.8	1.5	1.55	1.6	1.4	1.5
23	1.5	1.45	1.65	2.6	2.45	2.0	1.75	1.5	1.55	1.5	1.4	1.5
24	1.5	1.45	1.65	2.65	2.45	1.9	1.7	1.5	1.5	1.5	1.3	1.5
25	1.4	1.45	1.7	2.7	2.4	1.9	1.7	1.5	1.5	1.5	1.35	1.5
26	1.5	1.45	1.55	2.75	2.4	1.9	1.7	1.5	1.5	1.5	1.3	1.5
27	1.5	1.45	1.7	2.8	2.4	1.85	1.85	1.5	1.5	1.5	1.3	1.45
28	1.5	1.45	1.7	2.8	2.4	1.85	2.1	1.5	1.5	1.5	1.3	1.4
29	1.5	.....	1.7	2.7	2.4	1.85	1.9	1.5	1.5	1.5	1.3	1.4
30	1.5	.....	1.7	2.7	2.4	1.85	1.85	1.45	1.5	1.5	1.3	1.4
31	1.5	.....	1.6	.....	2.4	.....	1.8	1.45	.....	1.5	.....	1.4

Daily discharge, in second-feet, of Cottonwood Creek near Olancha, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	18	13	12	16	86	65	21	20	12	13	13	11
2	15	11	13	18	86	65	21	18	11	13	12	10
3	13	11	13	18	75	65	21	18	11	13	12	11
4	15	11	14	20	53	65	20	18	11	13	13	9
5	15	13	15	21	49	65	20	18	11	12	13	11
6	18	13	15	21	65	65	20	16	11	12	11	13
7	18	13	15	21	75	65	18	16	11	12	9	13
8	15	13	16	23	75	57	18	15	10	12	11	13
9	15	13	18	23	75	49	18	15	10	12	11	11
10	15	12	18	25	75	49	18	15	10	11	11	13
11	15	12	18	30	75	46	18	14	9	12	11	13
12	15	12	18	30	75	42	18	14	9	9	11	9
13	15	12	18	30	75	42	18	14	9	11	13	9
14	15	12	20	30	75	42	16	13	9	9	13	9
15	15	12	18	30	75	42	16	13	121	13	11	9
16	15	11	20	36	75	42	16	13	25	13	9	9
17	13	11	20	42	65	42	16	13	18	15	9	9
18	13	11	20	46	65	36	30	13	16	18	13	11
19	13	11	20	49	65	30	25	13	15	13	6	11
20	13	11	21	57	65	30	21	13	14	13	9	13
21	13	12	21	65	61	30	21	13	14	15	11	13
22	13	12	20	65	61	30	21	13	14	15	11	13
23	13	12	16	75	61	30	20	13	14	13	11	13
24	13	12	16	80	61	25	18	13	13	13	9	13
25	11	12	18	86	57	25	18	13	13	13	10	13
26	13	12	14	92	57	25	18	13	13	13	9	13
27	13	12	18	97	57	23	23	13	13	13	9	12
28	13	12	18	97	57	23	36	13	13	13	9	11
29	13	.....	18	86	57	23	25	13	13	13	9	11
30	13	.....	18	86	57	23	23	12	13	13	9	11
31	13	.....	15	.....	57	.....	21	12	.....	13	.....	11

NOTE.—Daily discharges determined from a discharge rating curve well defined above 10 second-feet.

Monthly discharge of Cottonwood Creek near Olancha, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	18	11		873	B.
February	13	11	11.9	661	B.
March	21	12	17.2	1,060	B.
April	97	16	47.2	2,810	B.
May	86	49	66.7	4,100	B.
June	65	23	42.0	2,500	B.
July	36	16	20.4	1,250	B.
August	20	12	14.3	879	B.
September	121	9	16.2	964	B.
October	18	9	12.8	787	B.
November	13	6	10.6	631	B.
December	13	9	11.3	695	B.
The year	121	6	23.8	15,800	

ASH CREEK NEAR OLANCHA, CAL.

Ash Creek discharges into Owens Lake.

The gaging station, which is located at a point just above the forks of the creek near the mouth of the canyon, about 16 miles south of Lone Pine, in sec. 11, T. 17 S., R. 36 E., Mount Diablo base and meridian, was established April 15, 1907.

No water is diverted above or near the station. Observations of gage heights have been discontinued, but discharge measurements were made during 1910.

Discharge measurements of Ash Creek near Olancha, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq.ft.*	*Feet.*	*Sec.-ft.*
Mar. 3	R. E. Haines	6.1	4.1	1.38	3.5
23	.....do	6.7	4.6	1.40	4.0
Apr. 13	.....do	7.3	7.7	1.87	4.7
May 4	.....do	9.0	13	2.40	16
25[a]	.....do	7.3	6.4	2.15	11
June 29	C. H. Lee	6.5	3.9	1.66	2.9
July 22[b]	Lee and Wood	7.1	6.5	2.01	1.9
Aug. 17	F. G. Wood	6.6	5.1	1.92	1.5
Sept. 2	.....do	6.8	4.5	1.80	1.2
21	G. T. Peekema	7.1	5.6	1.90	1.9
Oct. 28	.....do	7.2	6.7	2.09	1.9
Dec. 1[c]	.....do	6.3	3.7	1.61	1.7

[a] Made by wadng 20 feet above footbridge.
[b] Possible backiater effect from débris lodged below gage section during high water of July 18–19, 1910.
[c] Brush dam jw below measuring section removed.

MONO LAKE BASIN.[1]

GENERAL FEATURES.

Mono Lake lies at the eastern base of the Sierra Nevada in east-central California, within a few miles of the California-Nevada boundary. The western rim of its drainage area, formed by the crest line of

[1] Abstracted from Russell, I. C., Quaternary history of Mono Valley, Cal.; Eighth Ann. Rept. U. S. Geol. Survey, pt. 1, 1889, pp. 269–270, 287–288.

the Sierra, coincides for 36 miles with the western margin of the Great Basin.

The lake is 6,412 feet above the sea. The lowest pass in the serrate mountain crest along its western border is 3,000 feet above its surface. The highest peaks that overshadow it rise more than 6,000 feet above the level of the lake. The eastern portion of the basin partakes of the character of the arid region of interior drainage, and includes valleys covered with sagebrush and rugged mountain slopes, but scantily clothed with cedar and piñon. Over this portion no running water can be found during the greater part of the year. That it is not really a desert is shown by the fact that among the clumps of sagebrush it produces nutritious bunch grass in sufficient abundance to afford pasturage for a few cattle and horses.

The southwestern border of the basin includes magnificent mountains that are clothed in favored places with forests of pine. The highest peaks reach far above the timber line and bear a varied and beautiful alpine flora.

The lake derives the principal portion of its water supply from the creeks that descend the eastern slope of the Sierra and empty into it from the south and west. Supplementing the surface drainage are a number of springs, some of which are of considerable size.

The creeks tributary to Lake Mono are of clear water and flow through channels excavated for the most part in granite and metamorphosed sediments, but near their mouths they have eroded small gorges through material deposited during previous high-water stages of the lake. No chemical analyses of these waters have been made, but they undoubtedly hold a small percentage of mineral matter in solution which is left when evaporation takes place.

Most of the springs of the basin are either in the bottom of the lake or near its shores, and they are most numerous near the base of the mountains, which lie close to the western shore. Only three of those that rise on the land have a temperature noticeably above the normal. The character of most of those rising in the bottom of the lake is uncertain. Some of them reveal their presence in cold weather by the vapor to be seen on the lake surface above them, and are thus known to be thermal. None of the springs of the basin are highly charged with mineral matter, but, on the contrary, some of the more copious are remarkable for their purity.

RUSH CREEK NEAR MONO LAKE, CAL.

Rush Creek rises on the east slope of Mount Lyell (altitude, 13,090 feet above sea level), and flows in general northeastward into Mono Lake. To the south, on the opposite side of the Sierra Nevada divide, lie the headwaters of the North and Middle forks

of San Joaquin River; to the west and north are the headwaters of Merced and Tuolumne rivers.

Lakes are numerous in this basin, the more important being Marie Lake (altitude, 10,750 feet), Gem Lake (altitude, 9,030 feet), Silver Lake (altitude, 7,212 feet), Grant Lake (altitude, 7,060 feet), June Lake (altitude, 7,631 feet), Alger Lake (altitude, 10,500 feet), and Walker Lake (altitude, 7,926 feet). Gem, Silver, and Grant lakes lie in the course of the stream. At several of these lakes considerable storage could be developed, but no work has yet been done.

The principal tributaries, Reversed, Parker, and Walker creeks, are small streams and of little value without storage. No water power has been developed on this stream. In a distance of less than one-half mile above the mouth of Reversed Creek there is a total fall of 1,100 feet. The drainage area above is small, but storage could be developed at Gem Lake.

The rocks throughout the basin are principally granite and blue schist. The forest is thin and contains only a small amount of merchantable timber, chiefly yellow pine. The uncultivated valley land is covered with sagebrush. The soil is composed of volcanic ash and sand and requires a large amount of water for irrigation. As the tillable area lies 6,500 to 7,000 feet above sea level the growing season is short and the crops are restricted to the hardier grains and hay. About 300 acres are now irrigated from the main stream and its tributaries.

Gold, silver, and copper have been found in this area, but not in paying quantities.

The gaging station, which is located in the NE.$\frac{1}{4}$ sec. 13, T. 1 N., R. 26 E., Mount Diablo base and meridian, at the highway bridge 8 miles southeast of Mono Lake post office, one-fourth mile above the mouth of the creek, was established November 16, 1910.

The gage is a vertical staff fastened to a cottonwood tree on the right bank 3 feet above the bridge from which discharge measurements are made.

The channel is composed of sand and gravel and may shift at high stages.

The station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. D. McGlashan by wading 15 feet below bridge:

November 16, 1910: Width, 26 feet; area, 23 square feet; gage height, 2.82 feet; discharge, 41 second-feet.

Daily gage height, in feet, of Rush Creek near Mono Lake, Cal., for 1910.

[J. B. Anderson, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1			11			21		2.98
2			12		2.92	22		
3			13			23		2.80
4			14		2.95	24		
5			15			25		2.75
6		2.90	16	2.82	3.00	26		
7			17		3.00	27		2.75
8		2.90	18			28		
9			19		2.90	29		2.75
10		2.85	20			30		
						31		2.80

LEEVINING CREEK NEAR MONO LAKE, CAL.

Leevining Creek has its source at the glacier on the east slope of Conness Mountain (altitude, 12,556 feet above sea level), and flows in general easterly to Mono Lake. Rush Creek drains the adjoining area on the south. The basin, like that of Rush Creek, contains several lakes at which excellent storage reservoirs may be developed. The most important of these is Saddlebag Lake, 10,051 feet above sea level. Below are Tioga and Ellery lakes.

No water power has been developed on the stream except near the mouth, where a small plant furnishes power for domestic uses. Several power sites, however, have been filed upon. Immediately below Ellery Lake the creek falls a thousand feet in a distance of half a mile.

Throughout the basin there is good merchantable timber with little underbrush.

Agriculture is practically restricted to the land adjacent to Mono Lake. The soil is composed of volcanic ash and sand and requires a large amount of water for irrigation.

The gaging station, which is located 4 miles south of Mono Lake post office, at the ranger's camp in the SE. ¼ SE ¼ sec. 17, T. 1 N., R. 26 E., Mount Diablo base and meridian, Mono Lake National Forest, was established November 17, 1910.

Warren Creek, the most important tributary, enters about 5½ miles above the station and 8½ miles above Mono Lake. Less than 100 acres are irrigated in the small valley above the ranger's camp. Practically the entire low-water flow is used for irrigation near the mouth of the creek.

The gage is a vertical staff fastened to a Cottonwood tree on the left bank, 250 feet below the ranger's camp.

Discharge measurements are made by wading.

The channel is composed of gravel and small bowlders. Both banks are high and will not overflow.

This station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. D. McGlashan by wading 500 feet above gage:

November 17, 1910: Width, 22 feet; area, 25 square feet; gage height, 2.16 feet; discharge, 22 second-feet.

Daily gage height, in feet, of Leevining Creek near Mono Lake, Cal., for 1910.

[William J. Clarke, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		2.13	11		2.22	21	2.16	2.15
2		2.12	12		2.21	22	2.12	2.16
3		2.11	13		2.15	23	2.15	2.16
4		2.12	14		2.20	24		2.15
5		2.22	15		2.18	25	2.11	2.13
6		2.20	16		2.15	26	2.15	2.15
7		2.20	17	2.16	2.11	27	2.15	2.61
8		2.19	18	2.16	2.15	28	2.12	2.90
9		2.18	19	2.11	2.21	29	2.13	2.70
10		2.21	20	2.13	2.11	30	2.13	2.11
						31		2.60

NOTE.—Nov. 26, creek full of slush ice. Relation of gage height to discharge affected by ice Dec. 19, 27–30.

WALKER LAKE BASIN.

GENERAL FEATURES.

Walker Lake, which next to Pyramid Lake is the most picturesque and attractive of the desert lakes of Nevada, lies in the northern part of Esmeralda County. It is supplied entirely by Walker River, which enters at its north end.

As one of the lakes of the region occupied by glacial lake Lahontan, it was described by Russell[1] as follows:

The lake is 25.6 miles in its longer, or north and south axis, and has an average width of between 4.5 and 5 miles. Its area is 95 square miles. * * * Over a large area in the central and western portions it has a remarkably uniform depth of 224 feet; but as a rule the depth increases as one approaches the western shore, which is overshadowed by rugged mountains. The bottom throughout the central portions is composed of fine tenacious mud, which in many places is black in color and has the odor of hydrogen sulphide. Coarser deposits, consisting of sand and gravel, mingled with the empty shells of Pyrgula and Pompholyx, etc., were found only in the immediate neighborhood of the shore. * * *

As in the case of the other lakes in the Great Basin situated at an elevation of less than 5,000 feet, the shores of Walker Lake are totally lacking in arboreal vegetation except at the river mouth and are clothed only with desert shrubs. At the northern end, and following the immediate shores of Walker River for many miles, are luxuriant cottonwood groves, together with willow banks and meadow lands. * * *

The waters at a distance from the river mouth are of a clear deep blue, changing to a bright green tint near the shore, as in Pyramid Lake. They are charged with saline matter to such an extent that carbonate of lime is now being deposited.

[1] Russell, I. C., Geological history of Lake Lahontan, a Quaternary lake of northwestern Nevada: Mon. U. S. Geol. Survey, vol. 11, 1885, pp. 69–70.

Walker River, the inflowing stream, rises on the eastern slope of the Sierra Nevada in two main branches whose basins are separated by a group of mountains known as the Sweetwater Range. The East Fork of Walker River receives the drainage from the eastern slope of the Sweetwater Range and from the western slope of the Walker River Range; the West Fork flows at the base of the main range of the Sierra Nevada. From the union of the forks, near Yerington, the river flows sluggishly northward, passing through the fertile Yerington Valley (Mason Valley) to a point east of Wabuska, where it turns to the east and southeast, and 50 miles beyond the forks enters Walker Lake; length of the river from Walker Lake to the junction of Virginia and Green creeks, which form the East Walker, 120 miles, in which distance the total fall is 2,400 feet; fall in the 50 miles below the junction of the East and West Walker, about 400 feet.

The basin contains but three important valleys—Antelope Valley on the West Fork; Smith Valley, a fertile tableland presenting ample opportunity for reclamation, also under the West Fork; and Yerington Valley, which takes its water from the two forks. Only recently have the water rights in this last-named valley been adjusted. The minimum flow is not sufficient to supply the demand during the summer months, although excellent reservoir sites near the headwaters of the forks are available for storing the flood waters for use during the dry season. The snowfall in the winter months is very heavy, giving assurance of an ample supply for reservoirs.

No irrigation projects are at present being constructed, but surveys have been made by the Reclamation Service to show the feasibility of such projects. A line of levels run by the Reclamation Service from a point above Yerington to Carson River near Towle's ranch shows that water can be easily diverted by gravitation from the Walker River to the Carson River. The opportunities for power development afforded by both forks are as yet undeveloped by private companies because of the small demand for power near the rivers. Power development from the main stream is not feasible.

EAST WALKER RIVER NEAR MASON, NEV.

This station, which is located at the highway bridge, 7 miles above Mason, in the S. ½ NE. ¼ sec. 26, T. 12 N., R. 25 E., Mount Diablo base and meridian, was established November 21, 1910.

The East Walker unites with the West Walker about 2½ miles below the gage. Practically the entire low-water flow is used for irrigation above the station.

The vertical staff gage is on the left bank. Discharge measurements are made from the bridge 100 feet above the gage.

Both banks are high and will not overflow. The bed of the stream is composed of sand and fine gravel and will shift somewhat.

The following discharge measurement was made by H. D. McGlashan:

November 21, 1910: Width, 43 feet; area, 47 square feet; gage height, 3.94 feet; discharge, 96 second-feet.

Daily gage height, in feet, of East Walker River near Mason, Nev., for 1910.

[Mrs. J. H. Hillbun, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		3.7	11		3.9	21	3.94	4.05
2		3.72	12		4.05	22	3.95	4.0
3		3.75	13		4.0	23	3.95	3.95
4		3.8	14		3.95	24	3.90	3.95
5		4.1	15		3.9	25	3.90	4.15
6		4.0	16		3.9	26	3.85	4.15
7		4.0	17		3.8	27	[a]3.64	[b]3.8
8		4.0	18		3.8	28	3.62	3.65
9		3.95	19		3.7	29	3.64	3.65
10		3.9	20		3.8	30	3.65	3.6
						31		3.65

[a] Water turned into canal just above station. [b] Freezing.

WALKER RIVER AT MASON, NEV.

This station, which is located at the highway bridge at Mason, in the SW. ¼ sec. 33, T. 13 N., R. 25 E., Mount Diablo base and meridian, about 4½ miles below the junction of the East and West Walker rivers, was established November 21, 1910, to determine the amount of water available for irrigation in Mason Valley.

The gage is a vertical staff fastened to the second pile bent from the right end of the bridge.

Discharge measurements are made from the bridge.

The channel, which is composed of sand and fine gravel, is straight for some distance above and below the station. The bed is constantly shifting, but it is believed that the flow is fairly well controlled. The banks are of equal height and will not overflow except during exceptional floods.

The following discharge measurement was made by H. D. McGlashan:

November 21, 1910: Width, 101 feet; area, 134 square feet; gage height, 4.44 feet, discharge, 240 second-feet.

Daily gage height, in feet, of Walker River at Mason, Nev., for 1910.

[T. T. Kelley, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		4.4	11		4.5	21	4.44	4.3
2		4.4	12		4.5	22	4.41	4.3
3		4.4	13		4.5	23	4.45	4.3
4		4.45	14		4.4	24	4.45	4.3
5		4.6	15		4.3	25	4.4	4.35
6		4.5	16		4.3	26	4.45	4.4
7		4.5	17		4.3	27	4.4	4.3
8		4.5	18		4.3	28	4.3	4.3
9		4.5	19		4.3	29	4.3	4.15
10		4.5	20		4.25	30	4.4	4.0
						31		4.1

NOTE.—Ice along bank of river Dec. 16–18 and 27–31.

ROBINSON CREEK NEAR BRIDGEPORT, CAL.

Robinson Creek rises on the eastern slope of the Sierra in Mono County, Cal., and flows northeastward, passing through Twin Lakes to its junction with the East Fork of Walker River 2 miles north of Bridgeport. Its principal tributary is Buckeye Creek.

This station, which is located at the mouth of the canyon, 5½ miles southwest of Bridgeport, in the SW. ¼ NW. ¼ sec. 15, T. 4 N., R. 24 E., Mount Diablo base and meridian, in the Mono National Forest, was established November 18, 1910.

Lower Twin Lake is about 3 miles above the station and the junction with Buckeye Creek is 5 miles below. No water is diverted above the gage. The low-water flow is entirely used for irrigation in Bridgeport Valley. Twin Lakes is an excellent reservoir site. At the present time this storage is only partly developed.

The gage is a vertical staff fastened to a pine tree on the left bank near the site of an old sawmill.

Discharge measurements are made by wading near the gage.

Both banks are high and will not overflow. The channel is composed of gravel and small bowlders.

The station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. D. McGlashan by wading 150 feet above gage:

November 18, 1910:[1] Width, 8 feet; area, 6.1 square feet; gage height, 2.28 feet; discharge, 6.1 second-feet.

[1] Water undoubtedly being stored at Twin Lakes.

Daily gage height, in feet, of Robinson Creek near Bridgeport, Cal., for 1910.

[Henry W. Atcheson, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1			11			21		2.20
2			12			22		
3		2.33	13			23	2.25	
4			14		2.29	24		
5			15			25		
6			16			26	2.31	
7		2.28	17		2.25	27		
8			18	2.28		28		
9			19			29		
10		2.30	20			30	2.22	
						31		2.25

NOTE.—Slight ice noted by observer Nov. 26 and 30 and Dec. 21 and 31.

BUCKEYE CREEK NEAR BRIDGEPORT, CAL.

This station, which is located at the mouth of the canyon, one-half mile below Hot Springs, 4½ miles southwest of Bridgeport, in the SE. ¼ NW. ¼ sec. 3, T. 4 N., R. 24 E., Mount Diablo base and meridian, in the Mono National Forest, was established November 18, 1910.

Eagle Creek enters about 1 mile above and Buckeye Creek joins Robinson Creek about 4 miles below the station. This stream is largely used for irrigation, but no water is diverted above the station.

The gage is a vertical staff fastened to a large cottonwood tree on the left bank about one-half mile above the mouth of the canyon.

Discharge measurements are made by wading near the gage.

The right bank is high, but the river overflows the left bank for a short distance at flood stages. The channel, which is composed of gravel and bowlders, is rough. The current is swift at medium and high stages.

This station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. D. McGlashan by wading about 25 feet above the gage:

November 18, 1910: Width, 21 feet; area, 20 square feet; gage height, 2.79 feet; discharge, 27 second-feet.

Daily gage height, in feet, of Buckeye Creek at Bridgeport, Cal., for 1910.

[Henry W. Atcheson, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1			11			21		2.82
2			12			22		
3		2.88	13			23	2.82	
4			14		2.60	24		
5			15			25		
6			16			26	2.85	
7		2.80	17		2.72	27		
8			18	2.79		28		
9			19			29		
10		2.90	20			30	2.71	
						31		2.90

NOTE.—Nov. 26, thin ice near shore, slush ice flowing; Nov. 30 and Dec. 21, some ice present; Dec. 31, heavy slush ice flowing.

CARSON SINK BASIN.

GENERAL FEATURES.

Carson Sink lies in Churchill County, Nev., in the northern part of Carson Desert. During the winter and spring it receives a considerable supply of water from both Humboldt and Carson rivers and becomes a shallow, playa lake from 20 to 25 miles long and 14 miles broad. In arid summers the water supply fails and the lake evaporates to dryness, and as desiccation becomes more intense the salts impregnating the lake beds are brought to the surface and form an efflorescence several inches in thickness. In October, 1881, the sink was a broad, mud-colored plain, covered in places with a white alkaline crust that looked like patches of snow. In 1908 Carson Sink was mapped by the topographers of the United States Geological Survey as a permanent water body, 12 miles long by 12 miles miles broad, receiving Carson River on the south. The drainage line from Humboldt Lake to the sink was marked as an intermittent river.

CARSON RIVER BASIN.

GENERAL FEATURES.

Carson River is formed by its East[1] and West forks, which rise in the extreme eastern part of California and flow northeastward to their union near the town of Gardnerville, Nev. From this point the river flows northward to Empire, Nev., where it turns to the east and finally disappears into Carson Sink. It is about 160 miles long to the head of the East Fork, and its total fall is about 6,400 feet. In the 108 miles below the forks the fall is about 900 feet.

The principal tributaries of the East Carson are Silver King, Wolf, Silver, Markleeville, and Leviathan creeks. These streams drain a rough, mountainous country, ranging in altitude from 5,000 to 11,000 feet above sea level. Good storage sites exist on all the important tributaries. The reservoir sites in Pleasant Valley and on Silver Creek have been partly developed.

The area drained by the West Carson is not so large as that of the East Carson and its altitudes are, in general, lower. By constructing a reservoir at Hope Valley a large amount of power may be developed in the West Carson Canyon.

The soil throughout the Carson and Dayton valleys is very porous and its irrigation requires a large amount of water. The low-water flow is sufficient to reclaim only a small portion of the land. The irrigated acreage may, however, be greatly increased by constructing reservoirs on the headwaters to store the spring floods.

[1] Called East Carson River above mouth of Markleeville Creek.

EAST CARSON RIVER NEAR MARKLEEVILLE, CAL.

This station, which is located at Hangman's Bridge, 2 miles east of Markleeville, in the NE. ¼ sec. 27, T. 10 N., R. 20 E., Mount Diablo base and meridian, was established November 13, 1910.

Indian Creek enters 100 feet above and Markleeville Creek 1¼ miles below the station. All water diverted above Hangman's Bridge is used for power development. The discharge, as measured at this station, represents the natural run-off, except that the low-water flow during the irrigation season is augmented by a small amount of water stored on Silver Creek. Practically the entire low-water flow of the East and West Carson is used for the irrigation of Carson Valley.

The gage is a vertical staff bolted to the solid rock on the right bank 75 feet below the bridge.

At low and medium stages discharge measurements are made by wading; high-stage measurements are made from a car and cable about 3 miles above the gage.

The channel is composed of gravel and small bowlders and appears permanent. Both banks are high and will not overflow.

This station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. D. McGlashan by wading about 150 feet below Hangmans Bridge:

October 11, 1910. Width, 47 feet; area, 59 square feet; gage height,[1] 2.59 feet; discharge, 59 second-feet.

Daily gage height, in feet, of East Carson River near Markleeville, Cal., for 1910.

[H. W. Jones, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		2.55	11		2.90	21	2.60	2.51
2		2.58	12		2.80	22	2.60	2.56
3		3.18	13	2.60	2.70	23	2.61	2.60
4		2.60	14	2.62	2.51	24	2.67	2.64
5		2.50	15	2.60	2.50	25	2.62	
6		2.70	16	2.58	2.45	26	2.40	2.47
7		2.72	17	2.58	2.51	27	2.55	2.60
8		2.74	18	2.61	2.47	28	2.53	2.40
9		2.75	19	2.30	2.60	29	2.55	2.40
10		2.86	20	2.42	2.82	30	2.50	2.30
						31		2.30

NOTE.—Nov. 20, mush ice running; Nov. 26, ice at gage; Dec. 3, almost continuous rain 18 hours previous to reading of gage; Dec. 5, 14, 17, mush ice running; Dec. 26, ice at gage.

EAST FORK OF CARSON RIVER NEAR GARDNERVILLE, NEV.

This station, which is located at Horseshoe Bend, in the NW. ¼ sec. 13, T. 11 N., R. 20 E., about 9 miles south of Gardnerville, Nev., was established October 17, 1900, at Rodenbah's ranch, about 5 miles southeast of Gardnerville, was removed to the present site (3 miles

[1] Gage height determined Nov. 13 from reference point.

above the old station) on March 27, 1908, and was abandoned December 26, 1910. It was below all tributaries and above all diversion ditches.

The station was equipped with an inclined staff gage and a cable and car from which discharge measurements were made.

The relation between gage height and discharge was probably not affected by ice during 1910.

The section is permanent, conditions are favorable, and results are good.

This station was maintained by the United States Reclamation Service.

Discharge measurements made by Stone & Webster Engineering Corporation have been furnished to the United States Geological Survey.

Discharge measurements of East Fork of Carson River near Gardnerville, Nev., in 1910.

Date.	Hydrographer.	Area of section.	Gage height.	Discharge.
		Sq. ft.	*Feet.*	*Sec.-ft.*
Mar. 29	F. C. Schafer	105	3.20	385
Apr. 26	Stone & Webster Engineering Corporation	283	4.93	1,460
June 2	do	185	3.92	850
21	do	135	3.31	504
July 19	do	110	3.10	370
26	do	69	2.71	184
Sept. 28	do	64	2.50	89
Dec. 12	D. S. Stuver	65	2.68	154

Daily gage height, in feet, of East Fork of Carson River near Gardnerville, Nev., for 1910.

[H. M. Everett, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	2.8	3.2	3.3	4.1	5.1	3.2	2.6	2.5	2.5	2.5	2.55
2	3.0	2.8	3.2	3.3	4.1	4.9	3.1	2.55	2.5	2.5	2.5	2.55
3	2.8	2.8	3.2	3.3	4.0	4.6	3.1	2.5	2.5	2.5	2.5	2.9
4	2.7	2.8	3.2	3.4	4.0	4.4	3.1	2.5	2.5	2.5	2.5	2.9
5	2.7	2.8	3.5	4.0	3.7	4.1	3.1	2.5	2.5	2.5	2.5	2.8
6	2.7	2.8	3.4	4.3	3.9	4.3	3.1	2.45	2.5	2.5	2.5	2.7
7	2.7	2.8	3.4	4.4	4.3	4.0	3.0	2.45	2.5	2.5	2.5	2.7
8	2.7	2.8	3.4	4.5	4.6	3.9	3.0	2.45	2.5	2.5	2.5	2.6
9	2.7	2.8	3.4	4.2	5.0	3.9	3.0	2.45	2.5	2.5	2.5	2.6
10	2.7	2.8	3.4	4.0	5.5	3.7	2.9	2.45	2.5	2.5	2.5	2.6
11	2.7	2.9	3.4	4.1	4.8	3.8	2.9	2.45	2.5	2.5	2.5	2.6
12	2.7	2.9	3.4	3.7	4.6	3.9	2.9	2.45	2.5	2.5	2.5	2.6
13	2.7	2.7	3.4	3.9	4.5	3.8	2.8	2.45	2.5	2.5	2.5	2.6
14	2.7	2.7	3.6	4.1	4.5	3.8	2.8	2.45	2.55	2.5	2.5	2.6
15	2.7	2.7	3.4	4.0	4.7	3.7	2.7	2.45	2.6	2.5	2.5	2.6
16	2.7	2.7	3.4	4.0	4.6	3.6	2.7	2.45	2.6	2.5	2.5	2.6
17	2.7	2.7	3.4	4.5	3.9	3.6	2.7	2.45	2.55	2.5	2.5	2.6
18	2.7	2.7	4.3	4.7	4.5	3.5	3.25	2.45	2.55	2.5	2.5	2.6
19	2.7	2.7	4.5	4.8	4.5	3.5	3.0	2.45	2.55	2.5	2.5	2.6
20	2.7	2.8	4.2	5.0	4.5	3.4	3.25	2.45	2.5	2.5	2.5	2.6
21	2.7	2.8	3.9	4.6	4.6	3.3	3.0	2.45	2.5	2.5	2.5	2.6
22	3.5	2.8	3.8	4.7	4.8	3.3	2.9	2.45	2.5	2.5	2.5	2.6
23	3.7	2.8	3.5	4.7	4.9	3.3	2.9	2.45	2.5	2.5	2.5	2.55
24	2.8	2.8	3.3	4.9	5.6	3.3	2.9	2.45	2.5	2.5	2.5	2.55
25	2.7	2.8	3.2	5.0	4.5	3.3	2.8	2.5	2.5	2.5	2.5	2.55
26	2.7	2.8	3.2	5.1	4.6	3.3	2.75	2.5	2.5	2.5	2.5	2.55
27	2.7	2.8	3.2	5.2	4.9	3.3	2.7	2.5	2.5	2.5	2.55	.....
28	2.7	3.5	3.2	5.1	4.9	3.3	2.7	2.5	2.5	2.5	2.55	.....
29	2.7	.....	3.2	4.5	4.9	3.2	2.7	2.5	2.5	2.5	2.55	.....
30	2.8	.....	3.2	4.3	5.0	3.2	2.6	2.5	2.5	2.5	2.55	.....
31	2.8	.....	3.3	.....	5.1	.....	2.6	.....	.....	2.5	.....	.....

Daily discharge in second-feet of East Fork of Carson River near Gardnerville, Nev., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	290	200	390	440	900	1,620	390	123	90	90	90	106
2	290	200	390	440	900	1,460	340	106	90	90	90	106
3	200	200	390	440	840	1,240	340	90	90	90	90	245
4	160	200	390	493	840	1,100	340	90	90	90	90	245
5	160	200	546	840	660	900	340	90	90	90	90	200
6	160	200	493	1,030	780	1,030	340	75	90	90	90	160
7	160	200	493	1,100	1,030	840	290	75	90	90	90	160
8	160	200	493	1,170	1,240	780	290	75	90	90	90	123
9	160	200	493	960	1,540	780	290	75	90	90	90	123
10	160	200	493	840	1,940	660	245	75	90	90	90	123
11	160	245	493	900	1,380	720	245	75	90	90	90	123
12	160	245	493	660	1,240	780	245	75	90	90	90	123
13	160	160	493	780	1,170	720	200	75	90	90	90	123
14	160	160	600	900	1,170	720	200	75	106	90	90	123
15	160	160	493	840	1,310	660	160	75	123	90	90	123
16	160	160	493	840	1,240	600	160	75	123	90	90	123
17	160	160	493	1,170	780	600	160	75	106	90	90	123
18	160	160	1,030	1,310	1,170	546	415	75	106	90	90	123
19	160	160	1,170	1,380	1,170	546	290	75	106	90	90	123
20	160	200	960	1,540	1,170	493	415	75	90	90	90	123
21	160	200	780	1,240	1,240	440	290	75	90	90	90	123
22	546	200	720	1,310	1,380	440	245	75	90	90	90	123
23	660	200	546	1,310	1,460	440	245	75	90	90	90	106
24	200	200	440	1,460	2,020	440	245	75	90	90	90	106
25	160	200	390	1,540	1,170	440	200	90	90	90	90	106
26	160	200	390	1,620	1,240	440	180	90	90	90	90	106
27	160	200	390	1,700	1,460	440	160	90	90	90	106	106
28	160	546	390	1,620	1,460	440	160	90	90	90	106	106
29	160	.....	390	1,170	1,460	390	160	90	90	90	106	90
30	200	.....	390	1,030	1,540	390	123	90	90	90	106	90
31	200	.....	440	.....	1,620	.....	123	90	.....	90	.....	90

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined for all stages. Discharge Dec. 27–31 estimated.

Monthly discharge of East Fork of Carson River near Gardnerville, Nev., for 1910.

[Drainage area, 361 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	660	160	202	0.560	0.65	12,400	B.
February	546	160	206	.571	.59	11,400	B.
March	1,170	390	534	1.48	1.71	32,800	A.
April	1,700	440	1,070	2.96	3.30	63,700	A.
May	2,020	660	1,240	3.43	3.95	76,200	A.
June	1,620	390	703	1.95	2.18	41,800	A.
July	415	123	252	.698	.80	15,500	A.
August	123	75	82.4	.228	.26	5,070	B.
September	123	90	94.3	.261	.29	5,610	B.
October	90	90	90.0	.249	.29	5,530	B.
November	106	90	92.1	.255	.28	5,480	B.
December	245	[a] 90	128	.355	.41	7,870	B.
The year	2,020	75	392	1.09	14.71	283,000	

[a] Estimated.

CARSON RIVER AND BRUNSWICK MILL POWER CANAL NEAR EMPIRE, NEV.

This station, which is located at the county bridge at Brunswick Mill, one-fourth mile below the diversion dam of the Brunswick Mill Power Co. and 2 miles below Empire, Nev., was originally established October 21, 1900, at a point three-fourths of a mile east of Brunswick Mill and 2½ miles east of Empire, Nev. The original gage was washed out by a flood March 19, 1907. On April 12, 1907, a new gage was installed on the crest of the diversion dam of the Brunswick Mill canal, 1½ miles below Empire and 6 miles east of Carson City, Nev. Only one measurement was referred to this gage, and elevation of the gage datum was not referred to the crest of the dam, therefore the daily discharge can not be computed from this time until June 7, 1907, when a new gage was installed at the present site.

An inclined gage is located under the bridge. All gage heights since June 7, 1907, refer to the same datum.

Discharge measurements are made from a car and cable located just above the highway bridge.

The power canal of the mill has diverted water past the gage on the river since April 12, 1907, so its discharge must be added to give the total. As records have been kept on the canal only since April 13, 1908, the total flow of the river prior to that time can be estimated only approximately. The power is now used to pump water for irrigation, although formerly it was used to run a stamp mill. The station on the canal is at the bridge crossing the canal directly opposite the cable in the river.

The records at this point show the discharge of the river below the Gardnerville Valley and above the Dayton Valley, and are of value to the United States Reclamation Service in connection with the Truckee-Carson project and to the State engineer of Nevada in the adjustment of water rights.

The relation between gage height and discharge is at times affected by ice, but was probably not so affected during the winter of 1910.

Good results have been obtained at the station on the river, but the gage in the canal is within the influence of backwater from the mill and is not always an index of the discharge. Determinations of discharge for the canal are therefore only approximate.

This station is maintained in cooperation with the United States Reclamation Service.

Discharge measurements of Carson River near Empire, Nev., for 1910.

Date.	Hydrographer.	Width	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 30	F. C. Schafer	121	412	5.10	563
Oct. 9[a]	H. D. McGlashan	24	36	2.72	26
Dec. 13	D. S. Stuver	116	235	4.14	253

[a] Made by wading 100 feet below dam.

Daily gage height, in feet, of Carson River near Empire, Nev., for 1910.

[John Lloyd and D. I. Patterson, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.7	4.9	5.1	5.0	6.0	6.0	3.8	3.0	2.3	2.5	3.2	3.5
2	5.6	4.8	5.2	5.1	5.9	6.0	3.7	2.9	2.3	2.5	3.0	3.6
3	5.0	4.6	5.2	5.2	5.8	6.0	3.6	2.8	2.3	2.5	3.1	3.7
4	4.0	4.4	5.2	5.2	5.8	5.7	3.6	2.9	2.3	2.5	3.1	3.9
5	3.6	4.2	5.3	5.2	5.6	5.6	3.5	2.8	2.3	2.6	3.1	4.1
6	4.2	4.2	5.3	5.3	5.5	5.4	3.4	2.8	2.3	2.6	2.9	4.0
7	4.9	4.2	5.3	5.4	5.4	5.3	3.2	2.7	2.3	2.6	3.0	3.9
8	4.4	4.4	5.3	5.5	5.5	5.1	3.2	2.7	2.3	2.6	3.0	3.8
9	4.4	4.6	5.2	5.6	5.7	4.9	3.1	2.6	2.3	2.7	3.1	3.9
10	4.4	4.5	5.3	5.9	6.2	4.9	3.2	2.6	2.3	2.7	3.2	3.9
11	4.3	4.5	5.3	5.9	6.4	5.0	3.1	2.5	2.3	2.7	3.2	4.0
12	4.0	4.7	5.3	5.9	6.3	5.0	3.1	2.5	2.3	2.7	3.2	4.1
13	4.0	4.9	5.3	5.6	6.2	5.0	2.9	2.5	2.3	2.8	3.3	4.1
14	4.3	5.9	5.4	5.6	6.1	4.8	2.9	2.5	2.3	2.8	3.5	4.0
15	4.3	5.8	5.4	5.6	6.1	4.7	2.9	2.5	2.4	2.9	3.6	4.0
16	4.4	5.4	5.3	5.5	6.2	4.7	2.9	2.4	2.5	2.9	3.6	3.9
17	4.5	5.0	5.2	5.6	6.1	4.7	2.8	2.4	2.6	3.0	3.5	3.9
18	4.3	5.0	5.3	5.9	5.9	4.6	2.8	2.4	2.5	3.0	3.5	3.9
19	4.3	5.3	5.5	6.1	5.9	4.5	3.6	2.4	2.5	3.0	3.4	3.4
20	4.3	5.5	6.0	6.3	5.9	4.4	3.8	2.3	2.5	2.9	3.4	3.3
21	4.4	5.3	6.2	6.4	5.9	4.3	4.3	2.3	2.5	3.0	3.4	3.4
22	4.4	5.2	5.9	6.2	5.9	4.2	4.0	2.3	2.5	3.0	3.4	3.5
23	4.4	5.1	5.6	6.2	6.0	4.2	3.6	2.3	2.5	3.1	3.4	3.5
24	4.6	5.2	5.5	6.3	6.1	4.1	3.4	2.3	2.4	3.2	3.4	3.4
25	4.9	5.4	5.4	6.3	6.2	4.0	3.4	2.3	2.4	3.1	3.4	3.5
26	4.6	5.2	5.3	6.4	6.1	4.0	3.2	2.3	2.5	3.1	3.5	3.5
27	4.5	4.9	5.3	6.5	6.0	4.0	3.1	2.3	2.5	3.1	3.5	3.4
28	4.5	4.9	5.2	6.6	6.1	4.2	3.0	2.3	2.5	3.1	3.5	3.1
29	4.9	.....	5.2	6.7	6.1	3.9	3.0	2.3	2.5	3.1	3.5	3.0
30	4.9	.....	5.0	6.4	6.2	3.9	2.9	2.3	2.5	3.1	3.5	3.2
31	4.9	.....	5.0	.....	6.2	.....	3.0	2.3	.....	3.2	.....	3.3

Daily discharge, in second-feet, of Carson River near Empire, Nev., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	864	482	563	521	1,050	1,050	174	48	7.5	14	70	116
2	805	445	606	563	985	1,050	153	39	7.5	14	48	134
3	521	379	606	606	924	1,050	134	31	7.5	14	58	153
4	219	320	606	606	924	864	134	39	7.5	14	58	196
5	134	268	651	606	805	805	116	31	7.5	18.5	58	243
6	268	268	651	651	750	699	99	31	7.5	18.5	39	219
7	482	268	651	699	699	651	70	24	7.5	18.5	48	196
8	320	320	651	750	750	563	70	24	7.5	18.5	48	174
9	320	379	606	805	864	482	58	18.5	7.5	24	58	196
10	320	348	651	985	1,190	482	70	18.5	7.5	24	70	196
11	293	348	651	985	1,340	521	58	14	7.5	24	70	219
12	219	411	651	985	1,260	521	58	14	7.5	24	70	243
13	219	482	651	805	1,190	521	39	14	7.5	31	84	243
14	293	985	699	805	1,120	445	39	14	7.5	31	116	219
15	293	924	699	805	1,120	411	39	14	10.5	39	134	219

Daily discharge, in second-feet, of Carson River near Empire, Nev., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	320	699	651	750	1,190	411	39	10.5	14	39	134	196
17	348	521	606	805	1,120	411	31	10.5	18.5	48	116	196
18	293	521	651	985	985	379	31	10.5	14	48	116	196
19	293	651	750	1,120	985	348	134	10.5	14	48	99	99
20	293	750	1,050	1,260	985	320	174	7.5	14	39	99	84
21	320	651	1,190	1,340	985	293	293	7.5	14	48	99	99
22	320	606	985	1,190	985	268	219	7.5	14	48	99	116
23	320	563	805	1,190	1,050	268	134	7.5	14	58	99	116
24	379	606	750	1,260	1,120	243	99	7.5	10.5	70	99	99
25	482	699	699	1,260	1,190	219	99	7.5	10.5	58	99	116
26	379	606	651	1,340	1,120	219	70	7.5	14	58	116	116
27	348	482	651	1,420	1,050	219	58	7.5	14	58	116	99
28	348	482	606	1,500	1,120	268	48	7.5	14	58	116	58
29	482	.....	606	1,580	1,120	196	48	7.5	14	58	116	48
30	482	.....	521	1,340	1,190	196	39	7.5	14	58	116	70
31	482	.....	521	.....	1,190	.....	48	7.5	.....	70	.....	84

NOTE.—Daily discharge determined from a discharge rating curve, fairly well defined below 1,200 second-feet. Discharge of the power canal should be added to that of the river station to ascertain total discharge of river.

Daily gage height, in feet, of Brunswick Mill power canal near Empire, Nev., for 1910.

[D. I. Patterson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	2.8	3.0	3.0	4.0	4.0	.....	.....	.....	.....	2.9	.....
2	2.9	2.8	3.0	3.0	4.0	4.0	.....	.....	.....	.....	2.0	.....
3	2.9	2.7	3.0	3.0	3.9	4.0	.....	.....	.....	.....	2.3	.....
4	3.0	2.6	3.0	3.0	3.9	3.9	.....	.....	.....	.....	2.4	.....
5	3.0	2.6	3.0	3.0	3.8	3.9	.....	.....	.....	.....	2.7	.....
6	3.0	2.6	3.0	3.0	3.8	3.9	.....	.....	.....	.....	2.2	.....
7	3.0	2.6	3.0	3.1	3.8	3.8	.....	.....	.....	.....	2.2	.....
8	3.0	2.6	3.0	3.2	3.8	3.8	.....	.....	.....	.....	2.4	.....
9	3.0	2.6	3.0	3.3	3.9	3.8	.....	.....	.....	.....	2.4	.....
10	3.0	2.6	3.0	4.0	4.0	3.8	.....	.....	.....	.....	2.5	.....
11	3.0	2.6	3.0	4.0	4.0	3.8	.....	.....	.....	1.7	2.5	.....
12	3.2	2.6	3.0	4.0	4.0	3.8	.....	.....	.....	2.6	2.5	.....
13	3.6	2.8	3.0	3.6	4.0	3.8	.....	.....	.....	2.7	2.6	.....
14	3.0	3.0	3.0	3.6	4.0	3.7	.....	.....	.....	2.7	.....	.....
15	2.7	3.0	3.0	3.6	4.0	3.6	.....	.....	.....	2.7	.....	.....
16	2.7	3.0	3.0	3.6	4.0	3.6	.....	.....	.....	2.7	.....	.....
17	2.7	3.0	3.0	3.8	4.0	3.6	.....	.....	.....	2.8	.....	.....
18	2.7	3.0	3.0	3.8	4.0	3.5	.....	.....	.....	2.8	.....	.....
19	2.7	3.0	3.0	3.8	4.0	3.5	.....	.....	.....	2.8	2.8	.....
20	2.7	3.0	3.2	4.0	4.0	3.4	3.6	.....	.....	2.6	2.9	.....
21	2.7	3.0	3.3	4.0	4.0	3.4	3.9	.....	.....	2.8	3.0	.....
22	2.7	3.0	3.2	4.0	4.0	3.2	3.7	.....	.....	2.8	3.0	.....
23	2.7	3.0	3.0	4.0	4.0	3.2	3.4	.....	.....	2.9	3.0	.....
24	2.7	3.0	3.0	4.0	4.0	3.2	3.0	.....	.....	3.0	3.0	.....
25	2.8	3.0	3.0	4.0	4.0	3.2	3.0	.....	.....	3.0	3.0	.....
26	2.7	3.0	3.0	4.0	4.0	.....	2.8	.....	.....	2.9	3.1	.....
27	2.7	3.0	3.0	4.0	4.0	.....	.....	.....	.....	2.9	.....	.....
28	2.7	3.0	3.0	4.1	4.0	.....	.....	.....	.....	2.9	.....	.....
29	2.8	.....	3.0	4.1	4.0	.....	.....	.....	.....	2.9	.....	.....
30	2.8	.....	3.0	4.0	4.0	.....	.....	.....	.....	2.9	.....	.....
31	2.8	.....	3.0	.....	4.0	.....	.....	.....	.....	2.9	.....	.....

NOTE.—No water running in canal June 26 to July 19, July 27 to Sept. 24, and Nov. 14 to 18.
NOTE.—Relation of gage heights to discharge affected by backwater caused by the closing of gates about 800 feet below the gage; records therefore afford merely an approximate index of true values. Gage heights from Jan. 1 to June 17 probably a fairly accurate index of discharge.
Gage readings discontinued after Nov. 26.

Daily discharge, in second-feet, of Brunswick Mill power canal near Empire, Nev., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	82	75	82	82	116	116	0	0	0	.....	78	.....
2	78	75	82	82	116	116	0	0	0	.....	50	.....
3	78	72	82	82	112	116	0	0	0	.....	59	.....
4	82	69	82	82	112	112	0	0	0	.....	62	.....
5	82	69	82	82	109	112	0	0	0	.....	72	.....
6	82	69	82	82	109	112	0	0	0	.....	56	.....
7	82	69	82	85	109	109	0	0	0	.....	56	.....
8	82	69	82	88	109	109	0	0	0	.....	62	.....
9	82	69	82	92	113	109	0	0	0	.....	62	.....
10	82	69	82	116	116	109	0	0	0	.....	66	.....
11	82	69	82	116	116	109	0	0	0	41	66	.....
12	88	69	82	116	116	109	0	0	0	69	66	.....
13	102	75	82	102	116	109	0	0	0	72	69	.....
14	82	82	82	102	116	105	0	0	0	72	0	.....
15	72	82	82	102	116	102	0	0	0	72	0	.....
16	72	82	82	102	116	102	0	0	0	72	0	.....
17	72	82	82	109	116	102	0	0	0	75	0	.....
18	72	82	82	109	116	99	0	0	0	75	0	.....
19	72	82	82	109	116	99	0	0	0	75	75	.....
20	72	82	88	116	116	96	102	0	0	69	78	.....
21	72	82	92	116	116	96	112	0	0	75	82	.....
22	72	82	88	116	116	88	105	0	0	75	82	.....
23	72	82	82	116	116	88	95	0	0	78	82	.....
24	72	82	82	116	116	88	82	0	0	82	82	.....
25	75	82	82	116	116	88	82	0	.....	82	82	.....
26	72	82	82	116	116	0	75	0	.....	78	85	.....
27	72	82	82	116	116	0	0	0	.....	78	.....	.....
28	72	82	82	120	116	0	0	0	.....	78	.....	.....
29	75	.....	82	120	116	0	0	0	.....	78	.....	.....
30	75	.....	82	116	116	0	0	0	.....	78	.....	.....
31	75	.....	82	.....	116	.....	0	0	.....	78	.....	.....

NOTE.—Daily discharge determined from a rating curve based on discharge measurements made during 1909, which are affected by backwater. The figures are subject to large error and should be used with caution. No water flowing in canal June 26 to July 19, July 27 to Sept. 24, and Nov. 14 to 18. Discharge estimated Sept. 25 to Oct. 10 and Nov. 27 to Dec. 31. (See monthly discharge table.)

Monthly discharge of Carson River and Brunswick Mill power canal near Empire, Nev., for 1910.

[Drainage area, 988 square miles.]

Month.	Discharge in second-feet.						Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Power canal, mean.	Total mean.	Per square mile.	Depth in inches on drainage area.	Total in in acre-feet.	
January	864	134	370	77.5	448	0.453	0.52	27,500	B.
February	985	268	517	76.7	594	.601	.63	33,000	B.
March	1,190	521	687	82.7	770	.779	.90	47,300	B.
April	1,580	521	984	104	1,090	1.10	1.23	64,900	B.
May	1,340	699	1,040	115	1,160	1.17	1.35	71,300	A.
June	1,050	196	479	86.7	566	.572	.64	33,700	B.
July	293	31	92.7	21.1	114	.115	.13	7,010	C.
August	48	7.5	16.3	0.0	16.3	.016	.02	1,000	B.
September	18.5	7.5	10.8	3.00	13.8	.014	.02	821	C.
October	70	14	38.4	54.9	93.3	.094	.11	5,740	C.
November	134	39	88.9	60.4	149	.151	.17	8,870	C.
December	243	48	153	86.1	239	.242	.28	14,700	C.
The year	1,580	7.5	372	63.9	436	.441	6.00	316,000	

NOTE.—Totals represent combined discharge of river and power canal. The canal records should be considered approximate, but the records of the river are reliable. The total run-off at the river station is 269,000 acre-feet; that of the power canal is 47,000 acre-feet.

Discharge of power canal Sept. 25–30, estimated at 15 second-feet; Oct. 1–10, estimated at 15 second-feet; Nov. 27–30, estimated at 85 second-feet.

CARSON RIVER NEAR HAZEN, NEV.

This station, which is located about 8 miles south of Hazen and about 1,500 feet above Truckee canal chute, in the SE. ¼ sec. 33 T. 19 N., R. 26 E., was established January 12, 1908, and abandoned December 5, 1910.

The Lahontan dam, under construction at this point by the United States Reclamation Service, will impound about 300,000 acre-feet of water and conserve the flood waters of the Carson and also the water delivered by the Truckee canal.

To avoid the effect of backwater from the canal chute the gage was moved upstream on April 28, 1908. Gage heights prior to that time are of no value and have not been published.

Discharge measurements are made by wading and from the cable, which is about 1,500 feet upstream from the chute at the end of the canal. An inclined gage is located on the left bank just below the cable.

The plotting of the discharge measurements indicates some shift in the channel. A fairly well-defined discharge rating curve has been developed, however. The 1908 gage heights are given in Water-Supply Paper 250, page 128.

This station was maintained by the United States Reclamation Service.

The following discharge measurement was made by wading by F. C. Schafer:

August 23, 1910: Width, 8 feet; gage height, 1.35 feet; discharge, 1.1 second-feet.

Daily gage height, in feet, of Carson River near Hazen, Nev., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.25	3.4	3.45	3.45	4.35	4.1	2.6	1.9	.....	.....	2.1	2.3
2	3.5	3.65	3.45	3.45	4.1	4.1	2.5	1.85	.....	.....	2.1	2.3
3	3.6	3.7	3.55	3.5	4.0	4.0	2.4	1.8	.....	.....	2.1	2.4
4	3.3	3.5	3.6	3.5	3.9	4.0	2.4	1.8	.....	.....	2.1	2.42
5	3.3	3.65	3.55	3.55	3.85	3.9	2.4	1.75	.....	.....	2.15	2.45
6	3.6	3.5	3.6	3.55	3.8	3.8	2.35	1.75	.....	1.65	2.15	.....
7	3.95	3.45	3.65	3.6	3.65	3.6	2.35	1.7	.....	1.7	2.15	.....
8	4.2	3.4	3.6	3.65	3.6	3.5	2.35	1.7	.....	1.7	2.15	.....
9	4.3	3.05	3.55	3.65	3.6	3.4	2.3	1.7	.....	1.75	2.15	.....
10	4.15	3.25	3.6	3.75	3.75	3.3	2.2	1.65	.....	1.75	2.15	.....
11	3.95	3.25	3.6	3.9	4.15	3.3	2.15	1.65	.....	1.75	2.2	.....
12	4.8	3.3	3.6	3.95	4.3	3.3	2.1	1.55	.....	1.75	2.2	.....
13	3.85	3.6	3.6	3.95	4.2	3.3	2.0	1.55	.....	1.8	2.2	.....
14	3.6	3.75	3.65	3.75	4.1	3.3	2.0	1.45	.....	1.85	2.25	.....
15	3.55	4.1	3.7	3.75	4.1	3.15	1.95	1.4	.....	1.9	2.25	.....
16	3.25	4.15	3.7	3.8	4.1	3.15	1.9	1.4	.....	1.9	2.3	.....
17	3.5	3.8	3.65	3.7	4.2	3.15	1.85	1.35	.....	1.9	2.3	.....
18	3.55	3.7	3.6	3.75	4.2	3.1	1.8	1.35	.....	1.9	2.35	.....
19	3.5	3.55	3.6	3.9	3.95	3.05	1.75	1.35	.....	1.95	2.3	.....
20	3.5	3.75	3.7	4.1	3.95	3.06	1.75	1.35	.....	2.0	2.3	.....
21	3.2	3.75	4.0	4.25	3.95	3.0	1.75	.....	.....	2.05	2.3	.....
22	3.05	3.75	4.25	4.35	3.9	2.95	1.75	.....	.....	2.05	2.3	.....
23	3.15	3.6	4.0	4.15	3.9	2.9	2.4	.....	.....	2.05	2.3	.....
24	3.25	3.6	3.85	4.2	3.95	2.85	2.35	.....	.....	2.1	2.3	.....
25	3.5	3.55	3.8	4.3	4.05	2.75	2.25	.....	.....	2.1	2.3	.....

Daily gage height, in feet, of Carson River near Hazen, Nev., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	3.45	3.7	3.7	4.3	4.1	2.7	2.15	.....	.....	2.1	2.3	.....
27	3.5	3.65	3.7	4.3	4.15	2.65	2.15	.....	.....	2.1	2.3	.....
28	3.4	3.45	3.6	4.4	4.05	2.65	2.1	.....	.....	2.1	2.3	.....
29	3.3	.....	3.55	4.55	4.1	2.65	2.05	.....	.....	2.1	2.3	.....
30	3.4	.....	3.5	4.65	4.1	2.65	1.95	.....	.....	2.15	2.3	.....
31	3.4	.....	3.5	.....	4.1	.....	1.9	.....	.....	2.1	.....	.....

NOTE.—The river was dry from Aug. 21 to Oct. 5.

Daily discharge, in second-feet, of Carson River near Hazen, Nev., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	460	550	580	580	1,280	1,060	175	33	0	0	60	98
2	610	715	580	580	1,060	1,060	145	28	0	0	60	98
3	680	750	645	610	980	980	120	24	0	0	60	120
4	490	610	680	610	900	980	120	24	0	0	60	125
5	490	715	645	645	860	900	120	20	0	0	69	132
6	680	610	680	645	820	820	109	20	0	14	69	.....
7	940	580	715	680	715	680	109	17	0	17	69	.....
8	1,150	550	680	715	680	610	109	17	0	17	69	.....
9	1,240	355	645	715	680	550	98	17	0	20	69	.....
10	1,100	460	680	785	785	490	78	14	0	20	69	.....
11	940	460	680	900	1,100	490	69	14	0	20	78	.....
12	1,690	490	680	940	1,240	490	60	8	0	20	78	.....
13	860	680	680	940	1,150	490	45	8	0	24	78	.....
14	680	785	715	785	1,060	490	45	4	0	28	88	.....
15	645	1,060	750	785	1,060	405	39	2	0	33	88	.....
16	460	1,100	750	820	1,060	405	33	2	0	33	98	.....
17	610	820	715	750	1,150	405	28	1	0	33	98	.....
18	645	750	680	785	1,150	380	24	1	0	33	109	.....
19	610	645	680	900	940	355	20	1	0	39	98	.....
20	610	785	750	1,060	940	355	20	1	0	45	98	.....
21	430	785	980	1,200	940	330	20	0	0	52	98	.....
22	355	785	1,200	1,280	900	310	20	0	0	52	98	.....
23	405	680	980	1,100	900	290	120	0	0	52	98	.....
24	460	680	860	1,150	940	270	109	0	0	60	98	.....
25	610	645	820	1,240	1,020	230	88	0	0	60	98	.....
26	580	750	750	1,240	1,060	210	69	0	0	60	98	.....
27	610	715	750	1,240	1,100	192	69	0	0	60	98	.....
28	550	580	680	1,330	1,020	192	60	0	0	60	98	.....
29	490	.....	645	1,460	1,060	192	52	0	0	60	98	.....
30	550	.....	610	1,560	1,060	192	39	0	0	69	98	.....
31	550	.....	610	.....	1,060	.....	33	0	.....	60	.....	.....

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Carson River near Hazen, Nev., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	1,690	355	683	42,000	A.
February	1,100	355	682	37,900	A.
March	1,200	580	726	44,600	A.
April	1,560	580	934	55,600	A.
May	1,280	680	989	60,800	A.
June	1,060	192	493	29,300	A.
July	175	20	72.4	4,450	A.
August	33	0	8.26	508	B.
September	0	0	0	0	
October	69	0	33.6	2,070	B.
November	109	60	84.8	5,050	A.
Dec. 1–5	132	98	115	1,140	A.
The period	.....	.....	.....	283,000	

SILVER CREEK NEAR MARKLEEVILLE, CAL.

Silver Creek is a tributary to East Carson River.

The gaging station, which is located in the SE. ¼ sec. 14, T. 9 N., R. 20 E., Mount Diablo base and meridian, in the Mono National Forest, at Silver Creek (an abandoned post office), 10 miles above Markleeville and 1¾ miles above the mouth of the river, was established November 12, 1910.

No water is diverted from this stream. Storage has been developed at the Upper and Lower Kinney lakes and Kinney Meadows by the Alpine Land & Reservoir Co.

The gage is a vertical staff fastened to a juniper tree on the right bank 75 feet below the bridge.

Discharge measurements are made from the footbridge.

The channel at the gage contains large bowlders and appears permanent. Both banks are high and will not overflow.

This station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. D. McGlashan by wading 20 feet above bridge:

November 12, 1910: Width, 12 feet; area, 5.3 square feet; gage height, 2.59 feet; discharge, 7 second-feet.

Daily gage height, in feet, of Silver Creek near Markleeville, Cal., for 1910.

[H. W. Jones, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1			11			21		
2			12	2.60		22		
3			13		2.81	23		2.80
4			14			24		
5			15			25		
6			16		2.95	26		
7		2.85	17		2.80	27		2.03
8			18			28		
9		2.87	19			29		
10			20		2.88	30		2.01
						31		

MARKLEEVILLE CREEK AT MARKLEEVILLE, CAL.

Markleeville Creek is formed by the union of Pleasant and Hot Springs creeks and flows northeastward to East Fork of Carson River three-fourths of a mile above the station.

The gaging station, which is located at the highway bridge at Markleeville, in the SE. ¼ sec. 21, T. 10 N., R. 20 E., Mount Diablo base and meridian, was established November 11, 1910.

Two ditches divert water from Hot Springs Creek. The upper one, which is small, irrigates the Hot Springs ranch; the lower, known as the Town ditch, was built in the early days to furnish water for domes-

tic use at Markleeville, then a large mining camp. Later this ditch was rebuilt and extended so as to irrigate land below the town.

The gage is a vertical staff on the left abutment of the highway bridge.

Discharge measurements are made from the bridge.

The channel is composed of gravel and bowlders. The banks are high and not subject to overflow.

This station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. D. McGlashan by wading 50 feet below highway bridge:

October 11, 1910: Width, 18 feet; area, 10 square feet; gage height,[1] 1.64 feet; discharge, 5.3 second-feet.

Daily gage height, in feet, of Markleeville Creek at Markleeville, Cal., for 1910.

[H. W. Jones, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		1.81	11	1.64	2.41	21	1.59	2.02
2		1.83	12	1.70	2.28	22	1.62	2.07
3		2.70	13	1.70	2.21	23	1.63	2.14
4		2.10	14	1.70	2.06	24	1.86	1.99
5		1.91	15	1.70	2.20	25	1.86	
6		1.97	16	1.66	2.09	26	1.65	2.05
7		2.03	17	1.63	1.98	27	1.93	2.32
8		2.06	18	1.68	2.25	28	1.83	2.30
9		2.11	19	1.62	2.33	29	1.81	2.35
10		2.22	20	1.60	2.01	30	1.81	2.01
						31		2.10

PLEASANT VALLEY CREEK AT MARKLEEVILLE, CAL.

Pleasant Valley Creek, a tributary of Markleeville Creek, rises in Alpine County, Cal., on the east slope of the Sierra Nevada, near the summit of the divide separating Carson River waters from those of the Mokelumne. Its course is northeastward to Hot Springs Creek, with which it unites to form Markleeville Creek.

The gaging station, which is located just above the footbridge 600 feet above the mouth of the creek, and about three-fourths mile southwest of Markleeville, in the NW. ¼ sec. 28, T. 10 N., R. 20 E., mount Diablo base and meridian, was established November 11, 1910.

Three irrigation ditches divert water from this stream. Two of these ditches irrigate about 300 acres of land and the return water enters the creek above the gage; the third heads about half a mile above the mouth and was originally constructed for use in placer mining along the East Carson River below Hangman's Bridge but is now used for irrigation near the mouth of Markleeville Creek.

[1] Water surface referenced and gage height deduced later.

Storage reservoirs are partly developed by the Alpine Land & Reservoir Co. at upper and lower Sunset Lakes, Tamarack Lake, Summit Lake, Raymond Lake, and Wet Meadows.

The gage is a vertical staff fastened to a cottonwood tree on the left bank, 25 feet above the footbridge.

At low and medium stages discharge measurements are made by wading; high-stage measurements are made from the footbridge.

A riffle, composed of large bowlders, is just below the gage and acts as a permanent control. The stream is rapid and the bed is rough.

This station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. D. McGlashan by wading 150 feet above mouth:

November 11, 1910: Width, 14 feet; area, 8.4 square feet; gage height, 2.91 feet; discharge, 4.5 second feet.

Daily gage height, in feet, of Pleasant Valley Creek at Markleeville, Cal., for 1910.

[H. W. Jones, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	.....	3.04	11	2.91	3.30	21	2.90	3.12
2	.....	3.04	12	2.91	3.23	22	2.91	3.10
3	.....	3.20	13	.....	3.19	23	2.92	3.07
4	.....	3.10	14	2.93	3.10	24	3.00	3.10
5	.....	2.98	15	.....	3.11	25	2.97	.....
6	.....	3.07	16	2.93	3.12	26	2.93	3.05
7	.....	3.10	17	2.92	3.10	27	2.91	3.08
8	.....	3.12	18	2.94	3.08	28	3.04	3.02
9	.....	3.04	19	2.92	3.10	29	3.04	3.01
10	.....	3.18	20	2.90	3.10	30	3.04	3.01
						31	.....	3.01

WEST FORK OF CARSON RIVER AT WOODFORDS, CAL.

West Fork of Carson River rises in Alpine County, Cal., on the eastern slope of the Sierra Nevada, heading well up toward the summit of the divide that separates Great Basin waters from those flowing through the Sacramento to the Pacific Ocean. It flows in a general northerly course and unites with East Fork in Douglas County, Nev.

The gaging station was originally established October 18, 1900, about one-half mile above the post office at Woodfords, Cal., and 200 feet from the main road between Woodfords and Blue Lake. Measurements were also made near this point in 1890, 1891, and 1892.[1] On May 18, 1907, the gage and benchmark were washed out. On June 8, 1907, the gage was reestablished near the highway bridge at Woodfords, one-half mile below the first location in SE. ¼ sec. 34, T. 11 N., R. 19 E., M. D. M., at a different datum. No change in

[1] See Thirteenth Ann. Report U. S. Geol. Survey, part III, p. 96.

location or datum has since been made. This is known as the bridge station.

No tributaries enter below the station. The records corrected for diversions show the amount of water available for storage in Hope Valley. As the stream is very swift at the bridge, the relation between gage height and discharge is probably not affected by ice. The present gage is a vertical staff on the left bank just above the highway bridge.

Discharge measurements are made from a car and cable about one-half mile above the gage.

During August, September, and October, 1910, three canals were diverting water between the former station at the cable and the gage at the bridge. A gage was installed one-fourth mile above the cable (cable gage) and three-fourths mile above Woodfords on the right bank above these diversions, and gage heights and measurements obtained by the Stone & Webster Engineering Corporation during this period. These, together with daily discharges and measurements of canal diversions, are published below.

Discharge measurements of West Fork of Carson River at Woodfords, Cal., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.		Discharge.
				Cable.	Bridge.	
		Feet.	*Sq. ft.*	*Feet.*	*Feet.*	*Sec.-ft.*
Mar. 30	F. C. Schafer	28	50	.....	2.25	132
July 27[a]	Stone & Webster Engineering Corporation	.....	.....	1.20	.....	47
Aug. 10[a]	....do	.....	.....	.80	.....	28
25[a]	....do	.....	.....	.70	.....	24
Oct. 11[a]	H. D. McGlashan	27	22	.78	.42	33
Dec. 12	D. S. Stuver	.....	32.5	.....	1.08	46

[a] Measurement made by wading near cable gage above all diversions.

Discharge measurements of canal diversions between cable and bridge gages at Woodfords, Cal., for 1910.

Date.	Upper canal.	Middle canal.	Lower canal.	Total diversion.
1910.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*
July 27	8.7	0	13.5	22.2
Aug. 10	9.9	.95	8.6	19.45
Aug. 13	8.8	0	9.0	17.8
Aug. 25	6.3	1.6	10.8	18.7
Sept. 8	10.4	.4	7.8	18.6

NOTE.—Measurements made by Stone & Webster Engineering Corporation.

Daily gage height, in feet, of West Fork of Carson River at Woodfords, Cal., for 1910.

[Bridge station.]

[Bernice Merrill, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.6	1.6	1.9	3.1	3.65	2.8	1.6	0.9	0.9	0.8	0.9	.....
2	1.4	1.4	1.8	3.1	3.6	2.7	1.6	.....	.....	.....	.9	1.8
3	1.2	1.2	1.8	3.1	3.55	2.6	1.4	.85	.....	.0	.9	1.6
4	1.0	1.0	1.7	2.9	3.55	2.6	1.3	.....	.85	.....	.9	1.1
5	1.0	1.0	1.6	2.95	3.5	2.5	1.35	.8	.2	.....	.85	1.1
6	1.0	1.2	1.5	2.95	3.4	2.5	1.35	.....	.....	.....	.85	1.2
7	.98	1.1	1.4	3.0	3.2	2.55	1.4	.....	.0	.....	.7	1.3
8	.98	1.0	1.3	3.15	3.5	2.35	1.4	.4	.....	.....	.7	1.3
9	.99	1.0	1.3	3.4	3.6	2.25	1.4	.....	.....	.....	.7	1.3
10	1.0	1.0	1.3	3.55	3.6	2.2	1.3	.....	.....	.3	.7	1.3
11	.9	1.0	1.3	3.6	3.7	2.2	1.2	.3	.....	.4	.9	1.3
12	.96	1.2	1.4	3.6	3.8	2.3	1.2	.....	.9	.52	.9	1.4
13	.9	1.2	1.45	3.65	3.9	2.3	1.3	.4	.....	.65	1.0	1.4
14	1.1	1.4	1.5	3.7	3.8	2.4	1.4	.6	1.1	.....	1.0	1.2
15	1.1	1.6	1.5	3.7	3.7	2.4	1.6	.....	1.3	.....	.9	1.0
16	1.6	1.7	1.55	3.7	3.6	2.45	1.8	.....	1.2	.....	.85	1.0
17	1.8	1.8	1.55	3.75	3.4	2.3	1.9	.7	.....	.0	.85	.95
18	1.2	1.8	1.6	3.75	3.2	2.3	2.0	.....	1.1	.....	.8	.9
19	1.0	1.8	1.8	3.8	3.1	2.3	2.3	.....	.....	.....	.8	.95
20	1.0	1.8	2.3	3.8	3.1	2.4	2.3	.8	.0	.....	.7	.8
21	1.0	1.9	2.9	3.9	3.0	2.45	2.0	.....	.....	.....	.7	.8
22	1.0	1.9	3.3	3.9	2.9	2.4	1.8	.6	.....	.....	.75	.9
23	1.0	1.9	3.1	4.0	2.9	2.3	1.4	.....	.....	.....	.8	.9
24	1.0	1.95	2.8	3.95	2.95	2.3	1.3	.5	.....	.....	.8	1.0
25	.95	1.95	2.9	3.9	2.8	2.2	1.2	.3	.....	.....	.8	1.0
26	.95	1.9	2.9	3.9	2.8	2.1	1.2	.2	.8	.....	.8	.95
27	1.0	1.8	3.0	3.8	2.8	2.1	1.0	.....	.....	.....	.8	.9
28	1.0	1.8	3.0	3.75	2.7	1.95	1.1	.1	.7	.....	.95	.8
29	1.2	.....	3.0	3.7	2.7	1.8	1.0	.9	.....	.....	.95	.8
30	1.4	.....	3.0	3.7	2.8	1.8	.9	.....	.8	.....	.....	.8
31	1.5	.....	3.1	.....	2.95	.....	.9	.8	.....	.9	.....	.8

NOTE.—These gage heights represent the quantity of water remaining in the river below the canal diversions between the cable and bridge gages.

Water was being diverted between these gages prior to August 8 to 13, 22 to 28, September 5 to 13, 20 to 25, October 3 to 12, and 17 to 30.

Daily discharge, in second-feet, of West Fork of Carson River at Woodfords, Cal., for 1910.

[Bridge station.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	79	79	107	321	474	250	79	31	31	26	31	76
2	62	62	97	321	460	230	79	30	30	26	31	97
3	47	47	97	321	446	210	62	28	29	2	31	79
4	36	36	88	273	446	210	54	27	28	2	31	41
5	36	36	79	284	431	192	58	26	5	3	28	41
6	36	47	70	284	403	192	58	26	4	4	28	47
7	35	41	62	296	347	201	62	26	2	5	21	54
8	35	36	54	334	431	168	62	10	2	6	21	54
9	36	36	54	403	460	152	62	9	2	7	21	54
10	36	36	54	446	460	145	54	8	2	7	21	54
11	31	36	54	460	489	145	47	7	2	10	31	54
12	34	47	62	460	519	160	47	8	31	14	31	62
13	31	47	66	474	549	160	54	10	36	19	36	62
14	41	62	70	489	519	175	62	17	41	20	36	47
15	41	79	70	489	489	175	79	18	54	20	31	36
16	79	88	74	489	460	184	97	20	47	20	28	36
17	97	97	74	504	403	160	107	21	44	2	28	34
18	47	97	79	504	347	160	117	23	41	2	26	31
19	36	97	97	519	321	160	160	24	35	2	26	34
20	36	97	160	519	321	175	160	26	2	2	21	26

Daily discharge, in second-feet, of West Fork of Carson River at Woodfords, Cal., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	36	107	273	549	296	184	117	28	2	2	21	26
22	36	107	375	549	273	175	97	17	2	2	24	31
23	36	107	321	580	273	160	62	15	2	2	26	31
24	36	112	250	564	284	160	54	13	2	2	26	36
25	34	112	273	549	250	145	47	7	2	2	26	36
26	34	107	273	549	250	130	47	5	26	2	26	34
27	36	97	296	519	250	130	36	4	24	2	26	31
28	36	97	296	504	230	112	41	3	21	2	34	26
29	47	.....	296	489	230	97	36	31	24	2	34	26
30	62	.....	296	489	250	97	31	28	26	2	55	26
31	70	.....	321	.....	284	.....	31	26	.....	31	.....	26

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined for all stages. Discharge interpolated or estimated for days on which gage was not read.

Daily gage height, in feet, and discharge, in second-feet, of West Carson River at Woodfords, Cal., for 1910.

[Cable station.]

Day.	Aug.		Sept.		Oct.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	1.0	36	0.7	24	0.7	24
2	.9	32	.7	24	.7	24
3	.9	32	.7	24	.....	24
4	.85	30	.7	24	.7	24
5	.....	29	.75	26	.....	24
6	.8	28	.7	24	.....	24
7	.8	28	.....	24	.7	24
8	.8	28	.7	24	.7	24
9	.....	28	.7	24	.....	25
10	.8	28	.7	24	.75	26
11	.8	28	.7	24	.75	26
12	.7	24	.7	24	.75	26
13	.6	20	.....	32	.75	26
14	.6	20	.....	39	.75	26
15	.8	28	1.2	47	.....	26
16	.....	26	1.2	47	.75	26
17	.7	24	1.1	42	.75	26
18	.7	24	.8	28	.75	26
19	.7	24	.75	26	.7	24
20	.....	26	.75	26	.75	26
21	.8	28	.7	24	.7	24
22	.8	28	.7	24	.7	24
23	.8	28	.7	24	.....	24
24	.8	28	.7	24	.....	24
25	.8	28	.7	24	.7	24
26	.8	28	.7	24	.7	24
27	.8	28	.7	24	.7	24
28	.8	28	.7	24	.....	23
29	.7	24	.7	24	.65	22
30	.7	24	.7	24	.....	22
31	.7	24	.....	.....	.65	22

NOTE.—Gage heights and daily discharge furnished by Stone & Webster Engineering Corporation.

Monthly discharge of West Fork of Carson River at Woodfords, Cal., for 1910.

[Drainage area, 70 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	97	31	44.3	0.633	0.73	2,720	B.
February	112	36	73.2	1.05	1.09	4,070	B.
March	375	54	156	2.23	2.57	9,590	B.
April	580	273	451	6.44	7.18	26,800	A.
May	549	230	376	5.37	6.19	23,100	A.
June	250	97	166	2.37	2.64	9,880	B.
July	160	31	69.6	.994	1.15	4,280	C.
August	36	20	27.1	.387	.45	1,670	C.
September	47	24	27.2	.389	.43	1,620	C.
October	26	22	24.5	.350	.40	1,510	B.
November	a 55	21	28.5	.407	.45	1,700	B.
December	97	26	43.5	.621	.72	2,670	B.
The year	580	20	124	1.77	24.00	89,600	

a Estimated.

NOTE.—Discharge Aug., Sept., and Oct. computed from daily discharge at the cable. Discharge second-feet per square mile and run-off depth in inches probably low during June and July due to diversions above the bridge gage.

HUMBOLDT RIVER BASIN.

GENERAL FEATURES.

Humboldt River rises in the northeastern part of Nevada and flows west and southwest a distance of about 350 miles to Humboldt Lake, in the western part of the State. The lake is but an expansion of the river that supplies it and is held by an immense gravel bank that was thrown completely across the valley by the currents of the lake that once occupied the region, at one time 500 feet deep at this point. The bank has been cut across by overflow of the lake and the breach partly filled by an artificial dam which has greatly increased the area of the lake. During the dry season the lake seldom overflows, but in times of excessive flood the waters escape southward to the northern part of Carson Desert, where they contribute to the water held by Carson Sink.

The entire area drained by the Humboldt is surrounded by high, rugged peaks, some of which rise 11,000 feet above the sea. The river is anomalous among the streams of the Great Basin in that both its source and its terminus are well within the area of interior drainage. Its valley is narrow, and its course and that of its tributaries lie in general through a barren region destitute of large trees and supporting few shrubs except scattered clusters of willows. The valley of the main stream affords the only east-west pass through the mountains of Nevada and is followed by the Southern Pacific Railroad.

During the early spring and summer months the run-off of the North and South forks is very heavy because of the melting of the snows at the headwaters; as soon as the snow is all gone the rivers are left without a source of supply and their channels gradually fall to a minimum discharge.

Several tributaries find their way into the main river, Rock Creek and Reese River entering near Battle Mountain, the North and South forks near Elko, and the Little Humboldt near Winnemucca.

Although opportunities for reclamation are many, the cost of the necessary work would be very great, owing to the engineering difficulties to be overcome. The basin affords several reservoir sites, where the flood waters could be collected and stored for use during the summer months.

Lovelock Valley is considered the most fertile valley in the basin, and the entire flow of the river is appropriated for irrigation.

Alfalfa and grass hay are the chief crops; the land is best adapted for grazing.

The availability of the stream for power development is small, owing to the slight fall. Possibly the best stream for this purpose is the South Fork.

HUMBOLDT RIVER NEAR GOLCONDA, NEV.

This station, which is located at the highway bridge $1\frac{1}{4}$ miles north of the town of Golconda, was established October 24, 1894, discontinued December 31, 1909, and reestablished September 8, 1910.

The station is below the central valley, below Reese River and Rock and Keely Creeks, and above all other important tributaries. Little Humboldt River enters about 12 miles below. Considerable water is diverted above the station, almost the entire low-water flow being used for irrigation.

During 1907 the staff gage was fastened to the bridge. The bridge and gage were washed out in December, 1907, and from January 1, 1908, to December 31, 1909, all readings were taken from the original inclined staff gage on the left bank, reading 0.1 foot higher than the gage on the bridge. A temporary staff gage was installed September 8, 1910, and on November 5, 1910, this was replaced by a permanent chain gage. The datum of this gage is 1.85 feet lower than the original inclined gage on the left bank.

Discharge measurements are made from the highway bridge or by wading.

The relation between gage height and discharge is believed not to be materially affected by ice, but information on this point is meager.

As the channel shifts somewhat the records are not of the best, but the station nevertheless probably affords more reliable data than are furnished by any other station on the Humboldt.

Discharge measurements of Humboldt River near Golconda, Nev., 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 8[a]	G. C. Baldwin	3.5	0.95	[b] 1.86	1.38
Nov. 5[a]	G. H. Canfield	27.5	10.3	1.82	1.20

[a] Wading measurements.
[b] Reading on temporary gage reduced to permanent chain gage.

Daily gage height, in feet, of Humboldt River near Golconda, Nev., for 1910.

[William Duyck, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	1.85	1.8	16	1.85	.....	1.85	1.9
2	.....	.....	1.85	1.8	17	1.85	.....	1.85	1.9
3	.....	.....	1.85	1.8	18	1.85	.....	1.85	2.0
4	.....	.....	1.85	1.8	19	1.85	.....	1.85	2.1
5	.....	.....	1.85	1.8	20	1.85	.....	1.85	2.1
6	.....	.....	1.8	1.8	21	1.85	1.85	1.85	2.1
7	.....	.....	1.8	1.8	22	1.85	1.85	1.85	2.2
8	1.85	.....	.....	1.8	23	1.85	1.85	1.85	.....
9	1.85	.....	1.8	1.8	24	1.85	1.85	.....	2.4
10	1.85	.....	1.8	1.8	25	1.85	1.85	1.85	2.5
11	1.85	.....	1.8	1.8	26	1.85	1.85	1.8	2.6
12	1.85	.....	1.8	1.8	27	1.85	1.85	1.8	2.6
13	1.85	.....	1.85	1.8	28	1.85	1.85	1.8	2.6
14	1.85	.....	1.85	1.8	29	1.85	1.85	1.8	2.6
15	1.85	.....	1.85	1.85	30	1.85	1.85	1.8	2.6
					31	.....	1.85	.....	2.7

NOTE.—No ice reported during December, but relation of gage height to discharge was probably affected by ice Dec. 16–31.

Monthly discharge of Humboldt River near Golconda, Nev., for 1910.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.
September	1.3	77.4	C.
October	1.3	79.9	C.
November	1.0	59.5	C.
December	1.0	61.5	C.
The period	.....	.....	

NOTE.—Monthly means estimated.

HUMBOLDT RIVER NEAR OREANA, NEV.

This station, which is located 1½ miles from Oreana railroad station, at the highway bridge on the upper road to Lovelock, was established January 27, 1896, at a point three-fourths mile above the present site, at which it was established September 7, 1910. Records at the original station were discontinued December 31, 1909.

Several staff gages with various datums have been in use at this station.

Discharge measurements of Humboldt River near Oreana, Nev., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq.ft.*	*Feet.*	*Sec.-ft.*
Sept. 7	G. C. Baldwin	38	38	2.72	24
Nov. 4[a]	G. H. Canfield	54	32.5	3.42	25.1

[a] Measured ¾ mile upstream.

Daily gage height, in feet, of Humboldt River near Oreana, Nev., for 1910.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	2.55	3.35	2.85	16	2.7	2.8	3.0	2.95
2	.....	2.65	3.35	2.85	17	2.75	2.9	2.95	2.8
3	.....	2.65	3.4	2.9	18	2.75	2.9	2.95	2.8
4	.....	2.7	3.4	2.9	19	2.75	2.9	2.8	2.85
5	.....	2.7	3.3	2.9	20	2.7	3.0	2.8	2.9
6	.....	2.7	3.3	2.95	21	2.65	3.0	2.8	2.95
7	2.7	2.7	3.25	2.95	22	2.65	3.1	2.85	2.95
8	2.65	2.7	3.0	3.0	23	2.6	3.1	2.9	3.1
9	2.5	2.7	2.9	3.1	24	2.6	3.1	2.95	3.15
10	2.5	2.7	2.95	3.15	25	2.6	3.15	3.0	3.15
11	2.55	2.75	3.1	3.1	26	2.6	3.2	3.1	3.1
12	2.4	2.75	3.2	3.0	27	2.6	3.2	3.1	3.0
13	2.4	2.75	3.2	2.9	28	2.6	3.25	3.1	2.9
14	2.45	2.8	3.2	2.9	29	2.55	3.25	3.0	2.95
15	2.65	2.8	3.1	2.95	30	2.55	3.3	3.0	3.0
					31	.....	3.3	.....	3.15

NOTE.—Observer reports ice in stream after Dec. 19; relation of gage height to discharge probably affected by ice Dec. 20–31.

Monthly discharge of Humboldt River near Oreana, Nev., for 1910.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.
September	20	1,190	C.
October	25	1,540	C.
November	20	1,190	C.
December	20	1,230	D.
The period	.....	.....	

NOTE.—Monthly means estimated.

BISHOP CREEK NEAR WELLS, NEV.

This station, which is located about 1 mile above the Pacific Reclamation Co.'s ranch house, 2 miles below the proposed dam site and about ½ mile below the point of diversion for the proposed main canal, in the center of sec. 27, T. 29 N., R. 62 E., Mount Diablo base and meridian, about 5 miles from Metropolis, Nev., and 10 miles from Wells, Nev., was established January 1, 1910, by the Pacific Reclamation Co.

Trout Creek enters from the north about 2 miles, and Burnt Creek, also from the north, 4½ miles below the weir.

The gage is a nail in the top of a post set level with the crest of the 20-foot Cipoletti weir by means of which discharge measurements are made. The head on the weir is measured by the foot rule. Moss collects on the crest of the weir and during the past year was not removed. The maximum discharge of this creek in 1910 was 176 feet on March 20. All data for this station have been furnished by the Pacific Reclamation Company.

Daily gage height, in feet, of Bishop Creek near Wells, Nev., for 1910

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.25	0.31	0.60	0.48	0.28	.....	.....	.....	.....	0.20	0.24
2	.....	.24	.32	.60	.46	.....	.....	.....	.....	0.19	.....	.23
3	.....	.24	.36	.....	.46	.....	0.21	.....	.....	.....	.21	.27
4	.....	.24	.40	.61	.51	.....	.....	.....	.....	.....	.21	.30
5	.....	.23	.44	.62	.78	.28	.....	0.18	.....	.20	.21	.25
6	.....	.....	.65	.....	.66	.....	.....	.....	.....	.....	.21	.25
7	.....	.24	.59	.60	.57	.27	.....	.....	.....	.....	.....	.25
8	.....	.24	.79	.60	.50	.27	.21	.....	.....	.....	.....	.25
9	.....	.24	.81	.65	.45	.26	.....	.....	.....	.20	.22	.27
10	.....	.24	.81	.71	.45	.26	.....	.....	.....	.....	.22	.30
11	.....	.24	.92	.66	.45	.26	.....	.....	0.19	.....	.....	.34
12	.....	.25	.96	.67	.44	.....	.....	.....	.....	.20	.23	.27
13	.....	.....	.93	.64	.43	.25	.....	.18	.....	.....	.....	.27
14	.....	.25	.98	.57	.....	.25	.20	.....	.20	.....	.....	.25
15	.....	.25	1.06	.54	.44	.25	.....	.....	.24	.....	.25	.24
16	.....	.25	1.10	.52	.43	.24	.....	.....	.20	.....	.....	.24
17	.....	.24	1.01	.50	.42	.24	.....	.....	.20	.....	.23	.24
18	.....	.23	1.23	.....	.40	.23	.....	.....	.....	.23	.....	.....
19	.....	.23	1.41	.49	.37	.....	.....	.....	.....	.....	.23	.21
20	.....	.....	1.90	.50	.35	.23	.19	.....	.....	.20	.....	.23
21	.....	.24	1.69	.49	.34	.22	.....	.....	.19	.....	.24	.22
22	0.25	.24	1.46	.49	.33	.....	.....	.....	.....	.20	.25	.19
23	.26	.24	1.04	.49	.....	.22	.....	.....	.....	.....	.28	.21
24	.26	.24	.92	.47	.31	.....	.....	.....	.....	.....	.25	.....
25	.25	.24	.83	.45	.30	.22	.....	.....	.....	.....	.23	.21
26	.25	.25	.96	.45	.....	.....	.....	.....	.19	.20	.22	.22
27	.25	.26	.87	.46	.30	.....	.....	.....	.....	.....	.22	.21
28	.26	.27	.75	.46	.29	.....	.....	.....	.....	.20	.24	.21
29	.26	.....	.61	.50	.29	.....	.....	.....	.....	.....	.25	.21
30	.25	.....	.60	.49	.29	.22	.....	.....	.....	.20	.24	.....
31	.25	.....	.61	.....	.....	.....	.....	.....	.....	.20	.....	.20

NOTE.—Gage heights represent the head in feet on the weir.

Daily discharge, in second-feet, of Bishop Creek near Wells, Nev., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.5	8.4	11.6	31.3	22.4	10.0	6.8	5.1	5.1	5.6	6.0	7.9
2	6.5	7.9	12.2	31.3	21.0	10.0	6.6	5.1	5.1	5.6	6.2	7.4
3	6.5	7.9	14.5	31.7	21.0	10.0	6.5	5.1	5.1	5.6	6.5	9.5
4	6.5	7.9	17.0	32.1	24.5	10.0	6.5	5.1	5.1	5.8	6.5	11.0
5	6.5	7.4	19.7	32.9	46.4	10.0	6.5	5.1	5.1	6.0	6.5	8.4
6	7.0	7.6	35.3	31.3	36.1	9.8	6.5	5.1	5.6	6.0	6.5	8.4
7	7.0	7.9	30.5	31.3	29.0	9.5	6.5	5.1	5.6	6.0	6.5	8.4
8	7.0	7.9	47.3	31.3	23.8	9.5	6.5	5.1	5.6	6.0	6.9	8.4
9	7.5	7.9	49.1	35.3	20.3	8.9	6.5	5.1	5.6	6.0	6.9	9.5
10	7.5	7.9	49.1	40.3	20.3	8.9	6.5	5.1	5.6	6.0	6.9	11.0
11	7.5	7.9	59.4	36.1	20.3	8.9	6.5	5.1	5.6	6.0	7.2	13.4
12	7.5	8.4	63.3	36.9	19.7	8.6	6.0	5.1	5.6	6.0	7.4	9.5
13	7.5	8.4	60.4	34.5	19.0	8.4	6.0	5.1	5.8	6.0	7.4	9.5
14	8.0	8.4	65.3	29.0	19.4	8.4	6.0	5.1	6.0	6.0	7.4	8.4
15	8.0	8.4	73.5	26.7	19.7	8.4	6.0	5.1	7.9	6.5	7.4	7.9
16	8.0	8.4	77.7	25.3	19.0	7.9	6.0	5.1	6.0	6.5	7.4	7.9
17	8.0	7.9	68.3	23.8	18.3	7.9	6.0	5.1	6.0	7.0	7.4	7.9
18	8.0	7.4	91.9	23.4	17.0	7.4	5.8	5.1	6.0	7.4	7.4	7.1
19	8.0	7.4	112.7	23.1	15.2	7.4	5.6	5.1	5.8	6.8	7.4	6.5
20	8.4	7.6	176.3	23.8	13.9	7.4	5.6	5.1	5.6	6.0	7.6	7.4
21	8.4	7.9	147.9	23.1	13.4	7.0	5.6	5.1	5.6	6.0	7.9	6.9
22	8.4	7.9	118.8	23.1	12.8	7.0	5.6	5.1	5.6	6.0	8.4	5.6
23	8.9	7.9	71.4	23.1	12.2	7.0	5.6	5.1	5.6	6.0	10.0	6.5
24	8.9	7.9	59.4	21.7	11.6	7.0	5.6	5.1	5.6	6.0	8.4	6.5
25	8.4	7.9	50.9	20.3	11.0	7.0	5.6	5.1	5.6	6.0	7.4	6.5
26	8.4	8.4	63.3	20.3	11.0	7.0	5.6	5.1	5.6	6.0	6.9	6.9
27	8.4	8.9	54.6	21.0	11.0	7.0	5.6	5.1	5.6	6.0	6.9	6.5
28	8.9	9.5	43.7	21.0	10.5	7.0	5.6	5.1	5.6	6.0	7.9	6.5
29	8.9	.....	32.1	23.8	10.5	7.0	5.6	5.1	5.6	6.0	8.4	6.5
30	8.4	.....	31.3	23.1	10.5	7.0	5.6	5.1	5.6	6.0	7.9	6.2
31	8.4	.....	32.1	.....	10.5	.....	5.6	5.1	.....	6.0	.....	6.0

NOTE.—Daily discharge computed by means of Francis weir formula. Discharge interpolated for days on which gage was not read.

Monthly discharge of Bishop Creek near Wells, Nev., for 1910.

[Drainage area, 125 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	8.9	6.5	7.80	0.062	0.07	480
February	9.5	7.4	8.04	.064	.07	447
March	176.3	11.6	59.4	.475	.55	3,650
April	40.3	20.3	27.7	.222	.25	1,650
May	46.4	10.5	18.4	.147	.17	1,130
June	10.0	7.0	8.24	.066	.07	490
July	6.8	5.6	6.02	.048	.06	370
August	5.1	5.1	5.10	.041	.05	314
September	7.9	5.1	5.66	.045	.05	337
October	7.4	5.6	6.09	.049	.06	374
November	10.0	6.0	7.32	.059	.07	436
December	11.0	5.6	7.94	.064	.07	488
The year	176.3	5.1	14.0	.112	1.54	10,200

NORTH FORK OF HUMBOLDT RIVER NEAR HALLECK, NEV.

This station, which is located one-fourth mile above the mouth of North Fork, 2 miles west of Elburz station on the Southern Pacific Railroad, and about 6 miles west of Halleck, the nearest post office,

was established October 10, 1902, discontinued December 31, 1909 and reestablished October 1, 1910.

A new gage, set to read the same as the old gage, was installed August 5, 1909.

Discharge measurements are made by means of a cable and car.

The relation between gage height and discharge seems to be affected by backwater from the main Humboldt. The river freezes during the winter, but information as to condition of the ice is very meager.

The channel shifts somewhat and the results are therefore only approximate.

The following discharge measurement was made by G. H. Canfield:

November 9, 1910: Width, 21 feet; area, 11.5 square feet; gage height, 2.98 feet; discharge, 10.0 second-feet.

Daily gage height, in feet, of North Fork of Humboldt River near Halleck, Nev., for 1910.

[F. R. Fowler, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1		2.75	2.9	3.25	16		2.85	3.0	3.35
2		2.75	2.9	3.25	17		2.9	3.1	3.4
3		2.75	2.95	3.25	18		2.85	3.1	3.4
4		2.75	2.95	3.25	19		2.8	3.1	3.4
5		2.75	2.9	3.2	20		2.8	3.1	3.45
6		2.75	2.9	3.2	21		2.8	3.15	3.45
7		2.75	2.9	3.25	22		2.8	3.15	3.5
8		2.8	2.9	3.3	23		2.8	3.2	3.5
9		2.8	2.9	3.3	24		2.8	3.2	3.5
10		2.8	2.9	3.3	25		2.85	3.3	
11		2.8	2.95	3.3	26		2.9	3.3	
12		2.8	3.0	3.3	27		2.9	3.3	
13		2.8	3.0	3.3	28		2.9	3.25	
14		2.8	3.0	3.3	29		2.9	3.25	
15	2.6	2.8	3.0	3.35	30		2.9	3.25	
					31		2.9		

NOTE.—Observer reports river frozen over Dec. 25; relation of gage height to discharge probably affected by ice Dec. 8 to 31.

Monthly discharge of North Fork of Humboldt River near Halleck, Nev., for 1910.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.
September	8	476	C.
October	10	615	C.
November	8	476	C.
December	5	307	D.

NOTE.—Monthly means have been estimated.

SOUTH FORK OF HUMBOLDT RIVER NEAR ELKO, NEV.

This station, which is located about 12 miles southwest of Elko, Nev., 6 miles above the mouth of the river and above the proposed reservoir site of the United States Reclamation Service, was established August 29, 1896, discontinued December 31, 1909, and reestablished September 9, 1910.

The gage was removed February 26, 1907, about 1,000 feet upstream; and gage heights since that time bear no determined relation to previous readings.

Discharge measurements are made by means of a cable and car or by wading.

The river freezes during two or three months of the winter, the ice probably reaching a considerable thickness, but information as to winter flow is very meager.

The channel at the station shifts somewhat, but measurements define a fair discharge rating curve.

Discharge measurements of South Fork of Humboldt River near Elko, Nev., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 9	G. C. Baldwin	.....	.....	1.0	.0
Nov. 8	G. H. Canfield	17	7.50	1.37	9.38

Daily gage height, in feet, and discharge, in second-feet, of South Fork of Humboldt River near Elko, Nev., for 1910.

[James Cowling, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	.....	.....	1.4	13	1.4	13	1.55	.....
2	.....	.....	1.4	13	1.4	13	1.5	.....
3	.....	.....	1.4	13	1.4	13	1.5	.....
4	.....	.....	1.4	13	1.4	13	1.5	.....
5	.....	.....	1.4	13	1.4	13	1.55	.....
6	.....	.....	1.4	13	1.4	13	1.55	.....
7	.....	.....	1.4	13	1.4	13	1.5	.....
8	.....	.....	1.4	13	1.4	13	1.6	.....
9	1.0	0	1.4	13	1.4	13	1.7	.....
10	.....	0	1.4	13	1.4	13	1.7	.....
11	1.0	0	1.4	13	1.4	13	1.8	.....
12	1.0	0	1.4	13	1.4	13	1.7	.....
13	1.0	0	1.4	13	1.4	13	1.6	.....
14	1.2	4	1.4	13	1.4	13	1.6	.....
15	2.4	114	1.4	13	1.4	13	1.75	.....
16	1.3	8	1.4	13	1.5	.....	1.8	.....
17	1.2	4	1.4	13	1.5	.....	1.8	.....
18	1.2	4	1.4	13	1.5	.....	1.8	.....
19	1.2	4	1.4	13	1.5	.....	1.8	.....
20	1.2	4	1.4	13	1.6	.....	1.9	.....
21	1.2	4	1.4	13	1.6	.....	2.0	.....
22	1.2	4	1.4	13	1.6	.....	2.0	.....
23	1.2	4	1.4	13	1.5	.....	2.0	.....
24	1.2	4	1.4	13	1.6	.....	2.0	.....
25	1.2	4	1.4	13	1.6	.....	2.0	.....
26	1.2	4	1.4	13	1.6	.....	2.0	.....
27	1.2	4	1.4	13	1.6	.....	2.0	.....
28	1.4	13	1.4	13	1.6	.....	2.0	.....
29	1.4	13	1.4	13	1.7	.....	2.0	.....
30	1.4	13	1.4	13	1.65	.....	2.0	.....
31	.....	.....	1.4	13	.....	.....	2.0	.....

NOTE.—Observer reports much ice on Nov. 16; relation of gage height to discharge probably affected by ice Nov. 16 to Dec. 31.

Daily discharge determined by a fairly well defined discharge rating curve drawn through low-water discharge measurements made during 1909 and 1910.

Monthly discharge of South Fork of Humboldt River near Elko, Nev., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
September	114	0	8	476	C.
October	13	13	13	799	C.
November	.....	.....	12	714	C.
December [a]	.....	.....	8	492	D.

[a] Estimated.

NOTE.—Discharge Sept. 1–8 estimated at 2 second-feet; Nov. 16–30, estimated at 10 second-feet.

PYRAMID AND WINNEMUCCA LAKE BASINS.[1]

GENERAL FEATURES.

Pyramid and Winnemucca lakes occupy two long, narrow basins in Washoe and Humboldt counties, Nev., and receive the waters of Truckee River, which sends a stream to each lake. The first published account of the bifurcation of Truckee River so as to supply two lakes is given by King, who says:

At the time of our first visit to this region, in 1867, the river bifurcated; one half flowed into Pyramid Lake, and the other through a river 4 or 5 miles long into Winnemucca Lake. At that time the level of Pyramid Lake was 3,890 feet above the sea, and of Winnemucca about 80 feet lower. Later, owing to the disturbance of the balance between influx and evaporation already alluded to as expressing itself in Utah by the rise and expansion of Great Salt Lake, the basin of Pyramid Lake was filled up, and a backwater overflowed the former region of bifurcation, so that now the surplus waters go down the channel into Winnemucca Lake, and that basin is rapidly filling.

Between 1867, the time of my first visit, and 1871, the time of my last visit, the area of Winnemucca Lake had nearly doubled, and it has risen from its old altitude about 22 feet, Pyramid Lake in the same time having been raised about 9 feet. The outlines as given upon our topographical maps are according to the survey of 1867, and form interesting data for future comparison.

The differences in elevation between Pyramid and Winnemucca lakes as reported by King and determined by Russell in 1882 are as follows: In 1867 Pyramid was 80 feet higher than Winnemucca; in 1872 Pyramid was 67 feet higher than Winnemucca; in 1882 Pyramid was 12 feet higher than Winnemucca, as determined by engineer's level; in 1890, when the region was surveyed by the topographers of the United States Geological Survey, Pyramid was but 5 feet higher than Winnemucca. The waters of both lakes are alkaline and brackish. Their shores, like those of all the lakes in the lower portion of the Great Basin, are clothed only with scanty growths of desert vegetation.

[1] Abstracted from Russell, I. C., Geological history of Lake Lahontan, a Quaternary lake of northwestern Nevada: Mon. U. S. Geol. Survey, vol. 11, 1885, pp. 56–66.

In the southern part of Pyramid Lake the water is slightly discolored by multitudes of shining particles that are rendered visible when a ray of light is passed through it, the lack of transparency is apparently due to the suspended silt brought down by Truckee River. In the northern part of the lake the water is wonderfully clear, and at some distance from the land is deep blue in color.

The largest islands in Pyramid Lake are Pyramid and Anaho, which rise in its southern part near the eastern shore. Anaho Island rises 520 feet above the water level of 1890, and is surrounded by water 150 to 300 feet deep. Pyramid Island rises 320 feet above the water level of 1890 and the water near its base is 150 to 175 feet deep.

TRUCKEE RIVER BASIN.

GENERAL FEATURES.

The Truckee River system comprises the main river and several minor tributaries, all having as their chief sources of supply small mountain lakes. Truckee River itself is the natural outlet of Lake Tahoe, a beautiful mountain lake, 193 square miles in area, lying at an elevation of 6,225 feet above sea level, and noted as the largest body of fresh water in the United States at so high an altitude. Nearly three-fourths of the lake is in California and the rest is in Nevada.

Issuing from the northwest side of Lake Tahoe the Truckee flows almost due north to the town of Truckee, Cal., where it turns to the east. At Wadsworth, Nev., the river again turns north and discharges into Pyramid and Winnemucca lakes. From Lake Tahoe to Verdi, Nev., a distance of 35 miles, the country is heavily timbered with fir and pine; below Verdi barren wastes alternate with small and fertile valleys—the Verdi Valley, the Reno or Truckee Valley, and the Wadsworth Valley—all of which have a rich, productive soil. The total length of the Truckee is about 110 miles and its total fall is about 2,350 feet.

Donner Creek, the natural outlet of Donner Lake, is the first important tributary of the Truckee, which it enters at the town of Truckee. Prosser Creek, the second tributary, and the natural outlet of several small lakes, enters about 5 miles northeast of Truckee, and Little Truckee River, the natural outlet of Webber and Independence lakes, comes in at Boca, Cal., about 2 miles farther along. Each of these tributaries rises at an elevation of 6,000 feet above sea level, and each flows from a lake whose capacity can be enlarged by building a dam across its outlet. The region about the lakes is thickly forested and receives during the winter months very heavy snowfall. During the season of thaw this snow affords an immense run-off, almost all of which could be stored by enlarging the natural lakes.

Three power plants have been installed on the Truckee—the Farad (Mystic), Fleish, and Washoe plants—with an emergency plant near Reno, Nev. The plants have an average capacity of about 2,500 horsepower each and they supply practically all the power used by the towns of Verdi, Reno, Carson City, Yerington, Gardnerville, Sparks, and Virginia City, Nev. There are many falls on the headwaters of the small tributaries.

Almost all the minimum flow of the river is appropriated for irrigation, but further storage development would make more water available for both irrigation and power.

Within the period covered by the records, 1907 was by far the wettest year and 1900 the driest year. The ratio in the two years for the state-line station was about 3.4 to 1.

LAKE TAHOE AT TAHOE, CAL.

Records of the height of Lake Tahoe have been kept since 1900 to determine the amount of water drawn from storage and the possibility of further regulation of the outflow. All gage heights recorded in the following table have been referred to a datum 6,220.0 feet above sea level, the gage now in use being set at that datum. The gage heights for 1907 and 1908 as given in Water-Supply Paper 250, page 102, refer to a datum 6,225.5 feet above sea level. The gage is located near the outlet in SE. ¼ sec. 6, T. 15 N., R. 17 E., Mount Diablo base and meridian.

From 1889 until early in 1904 the floor of the outlet gates of the dam had a mean elevation of 6,223.3 feet, and the crest of the spillway at its highest point was 6,229.3 feet. Since 1904 the mean elevation of the floor of the gates has been 6,223.08, that of the lowest gate 6,223.04, and that of the lowest part of the spillway has been 6,229.50.

The following table summarizes the fluctuations of the lake for the last 23 years as far as they have been recorded:

Table showing fluctuation of Lake Tahoe from 1888 to 1910.

Year.	High water.		Low water.		Fluctuation.
	Gage height.	Date.	Gage height.	Date.	
	Feet.		*Feet.*		*Feet.*
1888	4.90	Sept. 8			
1889	4.60	Spring.	3.05	October.	1.55
1890	8.55±				
1895	9.02	July 7	7.55	[a]Dec. 17	1.47
1900	7.00	June 17	5.87	[b]Oct. 17	1.17
1901	8.43	July 27	6.10	Jan. 1	2.33
1902	9.02	June 22	6.97	Dec. 5	2.05
1903	8.90	July 5	6.80	Jan. 21	2.10
1904	10.40	June 22	7.10	Feb. 5	3.30
1905	8.70	June 18	6.20	Dec. 23	2.50
1906	9.87	July 21	6.16	Jan. 5	3.71
1907	11.26	July 14	7.80	Jan. 19	3.46
1908	8.40	Jan. 1	6.10	Dec. 31	2.28
1909	8.88	July 11	6.10	Jan. 1	2.78
1910	8.48	June 2–11	5.80	Dec. 1–2	2.68

[a] The lake was also low in January. [b] Lower earlier in year, no record.

NOTE.—Records for 1888 to 1890 were reported by W. H. Hall.

Daily gage height, in feet, of Lake Tahoe at Tahoe, Cal., for 1910.

[J. U. Haley, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	7.65	7.46	7.58	.....	8.46	8.30	7.87	.....	6.58	6.08	.....
2	7.70	7.63	7.47	7.58	.....	8.48	8.30	7.84	.....	.....	6.08	5.80
3	7.72	7.60	7.45	7.58	.....	8.48	8.26	7.80	7.10	6.50	6.08	5.88
4	7.72	7.59	7.45	7.58	8.06	8.48	8.23	7.78	.....	6.50	6.06	5.94
5	7.69	7.58	7.45	7.58	8.06	8.48	8.20	7.76	.....	.....	6.06	5.98
6	7.65	7.56	7.42	7.60	8.06	8.48	8.20	7.76	.....	6.45	6.05	.....
7	7.68	7.53	7.41	7.60	8.10	8.48	8.20	7.74	.....	6.45	6.05	.....
8	7.67	7.52	7.41	7.62	8.10	8.48	8.18	7.70	.....	6.45	6.05	6.00
9	7.65	7.52	7.40	7.64	.....	8.48	8.16	7.68	6.96	.....	.....	6.00
10	7.60	7.51	7.39	7.65	.....	8.48	8.16	7.67	.....	.....	.....	6.02
11	7.60	7.50	7.38	7.65	.....	8.48	8.16	7.63	.....	.....	6.04	.....
12	7.58	7.50	7.38	7.67	8.20	.....	8.15	7.60	.....	6.35	6.06	.....
13	.....	.....	7.38	7.67	8.17	.....	.....	7.60	.....	.....	6.04	5.98
14	.....	.....	7.42	.....	.....	.....	.....	7.58	6.85	.....	6.04	5.98
15	.....	7.50	7.40	.....	.....	.....	.....	7.56	6.85	.....	6.02	5.98
16	7.50	7.50	7.40	7.73	.....	8.38	8.09	7.54	.....	6.20	6.02	5.98
17	7.50	7.50	7.40	7.78	8.25	8.38	8.06	7.50	.....	6.20	6.02	5.98
18	7.50	.....	7.40	7.78	8.25	8.38	8.04	7.49	.....	.....	6.00	.....
19	7.50	.....	.....	7.82	8.28	8.38	8.04	7.42	.....	.....	6.00	.....
20	7.48	.....	.....	7.88	8.30	8.38	8.04	7.40	6.70	6.20	5.90	5.88
21	7.48	.....	7.48	7.88	8.30	8.38	8.04	7.40	6.70	6.18	5.90	5.89
22	7.48	.....	.....	7.88	8.30	8.38	8.04	7.39	6.70	6.18	5.88	5.87
23	7.50	.....	7.56	7.89	8.30	8.38	8.02	7.39	6.65	6.15	5.88	5.86
24	.....	7.45	.....	7.89	8.30	8.38	8.00	7.39	6.62	6.15	5.85	5.84
25	.....	7.45	7.58	.....	8.33	8.38	8.00	7.37	6.60	6.15	5.85	5.85
26	7.70	7.45	.....	.....	8.35	8.38	7.96	7.35	6.60	6.15	5.85	5.85
27	7.70	7.45	7.58	.....	8.36	.....	7.94	7.33	6.58	6.12	5.85	5.88
28	7.70	7.45	7.58	.....	8.38	.....	7.92	7.30	.....	6.12	5.85	5.85
29	7.70	.....	7.58	8.00	8.40	.....	7.90	.....	6.58	6.11	5.83	5.82
30	7.70	.....	7.58	.....	8.40	.....	7.88	7.20	6.58	6.10	5.80	5.81
31	7.67	.....	7.58	.....	8.42	.....	7.88	.....	.....	6.08	.....	5.81

NOTE.—Lake too rough to obtain accurate readings on days for which no gage readings are given.

TRUCKEE RIVER AT TAHOE, CAL.

This station, which is located at Tahoe, Cal., about one-fourth mile below the outlet of Lake Tahoe, in the NW. ¼ sec. 7, T. 15 N., R. 17 E., was established July 3, 1895, discontinued February 29, 1896, and reestablished June 17, 1900, to obtain information needed by the United States Reclamation Service in connection with the Truckee-Carson project.

A timber dam across the river about 500 feet from the lake completely regulates the flow of the river, sometimes causing sudden fluctuations and often cutting down the outflow to 15 or 20 second-feet, or the amount of leakage through the dam.

The station is equipped with a vertical staff gage and a cable and car, from which discharge measurements are made.

The channel is liable to shift only in a slight degree and records are reliable. The datum of the gage has not been changed. The flow is practically unaffected by ice.

Discharge measurements made by the Stone & Webster Engineering Corporation have been furnished to the United States Geological Survey for publication.

Discharge measurements of Truckee River at Tahoe, Cal., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 3	L. O. Murphy	68	96	0.75	59
4	.....do	85	278	2.77	637
4	.....do	90	308	3.05	758
4	.....do	90	301	2.92	725
5	.....do	90	330	3.16	815
Mar. 13	Williamson and Bamstedt	30	44	1.10	102
17	L. O. Murphy	73	106	1.10	110
17	.....do	80	160	1.55	225
18	.....do	82	209	1.99	350
18	.....do	84	234	2.23	439
18	.....do	85	246	2.43	493
19	.....do	85	261	2.56	555
19	.....do	85	269	2.67	588
Sept. 19[a]	T. W. Norcross	82	222	2.23	469

[a] Not reliable.

NOTE.—All measurements made by Stone & Webster Engineering Corporation except September 19.

Daily gage height, in feet, of Truckee River at Tahoe, Cal., for 1910.

[J. U. Haley, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.35	1.66	3.18	1.10	1.90	1.20	2.09	2.90	2.50	2.08	1.78	1.85
2	3.37	2.46	3.18	1.10	1.90	1.20	2.20	2.90	2.50	2 08	1.78	1.85
3	3.37	3.08	3.18	1.10	1.74	1.20	3.10	2.85	2.50	2.07	1.78	1.85
4	3.37	3.20	3.18	1.10	1.30	1.20	2.95	2.85	2.40	2.07	1.78	1.73
5	3.37	3.20	3.18	1.10	1.30	1.20	2.95	2.85	2.40	2.07	1.78	1.70
6	3.37	3.20	3.18	1.10	1.30	1.20	2.95	2.85	2.40	2.07	1.77	1.77
7	3.37	3.20	3.18	1.10	1.30	1.53	2.95	2.85	2.38	2.05	1.77	1.78
8	3.37	3.20	3.16	1.10	1.30	1.65	2.95	2.85	2.37	2.04	1.78	1.78
9	3.37	3.20	3.15	1.10	1.30	2.04	2.95	2.80	2.35	2.02	1.78	1.78
10	3.37	3.20	3.14	1.10	1.30	1.89	2.76	2.78	2.35	2.00	1.78	1.80
11	3.37	3.20	3.13	1.10	1.30	1.89	2.76	2.20	2.35	2.00	1.78	1.80
12	3.37	3.20	3.12	1.10	1.21	2.50	2.76	2.78	2.30	2.00	1.78	1.80
13	3.35	3.20	1.07	1.10	1.10	1.90	2.76	2.78	2.30	2.00	1.76	1.80
14	3.35	3.20	1.10	1.10	1.10	1.87	2.76	2.78	2.25	1.98	1.76	1.70
15	3.35	3.20	1.10	1.10	1.10	2.44	2.76	2.78	2.25	1.98	1.76	1.69
16	3.34	3.20	1.10	1.10	1.10	1.92	3.00	2.76	2.25	1.98	1.76	1.69
17	3.34	3.20	1.66	1.10	1.10	2.09	3.00	2.74	2.25	1.97	1.76	1.69
18	3.32	3.20	2.22	1.10	1.10	1.98	3.00	2.72	2.25	1.97	1.75	1.69
19	3.32	3.20	1.10	1.10	1.10	1.98	3.00	2.70	2.25	1.95	1.75	1.62
20	3.31	3.19	1.10	1.10	1.10	1.98	2.15	2.70	2.00	1.93	1.70	1.62
21	3.30	3.18	1.10	1.10	1.10	1.98	2.30	2.70	2.04	1.90	1.70	1.62
22	3.30	3.18	1.10	1.10	1.15	1.98	2.30	2.68	2.02	1.90	1.70	1.62
23	3.30	3.18	1.10	1.10	1.15	2.23	2.87	2.68	1.96	1.90	1.85	1.61
24	3.30	3.18	1.10	1.10	1.15	2.16	2.90	2.68	1.96	1.88	1.85	1.60
25	3.30	3.18	1.10	1.10	1.15	2.16	2.90	2.66	2.15	1.88	1.85	1.60
26	3.30	3.18	1.10	1.52	1.15	3.00	2.90	2.65	2.12	1.88	1.85	1.60
27	3.30	3.18	1.10	2.40	1.15	2.25	2.90	2.65	2.10	1.88	1.85	1.58
28	3.30	3.18	1.10	2.40	1.15	2.25	2.90	2.65	2.10	1.88	1.85	1.76
29	3.30	.....	1.10	1.52	1.15	2.09	2.90	2.63	2.10	1.86	1.81	1.75
30	3.30	.....	1.10	1.90	1.20	2 09	2.90	2.55	2.10	1.84	1.78	1.73
31	3.28	.....	1.10	.....	1.20	.....	2.90	2.50	.....	1.80	.....	1.68

Daily discharge, in second-feet, of Truckee River at Tahoe, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	890	247	819	114	318	134	381	701	534	377	281	302
2	898	518	819	114	318	134	419	701	534	377	281	302
3	898	777	819	114	270	134	785	680	534	374	281	302
4	898	827	819	114	156	134	722	680	494	374	281	267
5	898	827	819	114	156	134	722	680	494	374	281	258
6	898	827	819	114	156	134	722	680	494	374	278	278
7	898	827	819	114	156	212	722	680	486	367	278	281
8	898	827	810	114	156	244	722	680	483	364	281	281
9	898	827	806	114	156	364	722	659	475	357	281	281
10	898	827	802	114	156	315	642	651	475	350	281	287
11	898	827	798	114	156	315	642	419	475	350	281	287
12	898	827	793	114	136	534	642	651	456	350	281	287
13	890	827	108	114	114	318	642	651	456	350	275	287
14	890	827	114	114	114	309	642	651	438	344	275	258
15	890	827	114	114	114	510	642	651	438	344	275	255
16	886	827	114	114	114	324	743	642	438	344	275	255
17	886	827	247	114	114	381	743	634	438	340	275	255
18	877	827	426	114	114	344	743	625	438	340	272	255
19	877	827	114	114	114	344	743	617	438	334	272	236
20	873	823	114	114	114	344	402	617	350	328	258	236
21	869	819	114	114	114	344	456	617	364	318	258	236
22	869	819	114	114	124	344	456	609	357	318	258	236
23	869	819	114	114	124	430	688	609	337	318	302	233
24	869	819	114	114	124	405	701	609	337	312	302	230
25	869	819	114	114	124	405	701	600	402	312	302	230
26	869	819	114	209	124	743	701	596	391	312	302	230
27	869	814	114	494	124	438	701	596	384	312	302	225
28	869	819	114	494	124	438	701	596	384	312	302	275
29	869	.....	114	209	124	381	701	588	384	306	290	272
30	869	.....	114	318	134	381	701	554	384	299	281	267
31	861	.....	114	.....	134	.....	701	534	.....	287	.....	252

NOTE.—Daily discharges determined from a discharge rating curve well defined for all stages.

Monthly discharge of Truckee River at Tahoe, Cal., for 1910.

[Drainage area, 519 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	898	861	883	1.70	1.96	54,300	B.
February	827	247	791	1.52	1.58	43,900	B.
March	819	108	398	.767	.88	24,500	A.
April	494	114	152	.293	.33	9,040	A.
May	318	114	148	.285	.33	9,100	A.
June	743	134	332	.640	.71	19,800	A.
July	785	381	656	1.26	1.45	40,300	A.
August	701	419	628	1.21	1.40	38,600	A.
September	534	337	436	.840	.94	25,900	A.
October	377	287	339	.653	.75	20,800	A.
November	302	258	281	.542	.60	16,700	A.
December	302	225	262	.505	.58	16,100	B.
The year	898	108	441	.85	11.51	319,000	

TRUCKEE RIVER AT NEVADA-CALIFORNIA STATE LINE.

This station, which is located 1 mile upstream from Calvada, a flag station on the Ogden route of the Southern Pacific Railroad near the Nevada-California State line, in California, 15 miles southwest, by railroad, of Reno, Nev., was established September 7, 1899, at Farad, 2½ miles farther upstream, and was moved to its present site June 14, 1909.

The station is below all tributaries which head in the Sierra Nevada and is above all diversions.

The station is equipped with an inclined staff gage and a cable and car, 50 feet upstream from the gage.

Flood measurements are made with difficulty owing to the high velocities of the current.

The flow is probably unaffected by ice. The channel shifts somewhat at each high-water period so that additional measurements must be made to define the low-water curve.

Records are fairly reliable.

This station is maintained in cooperation with the United States Reclamation Service.

Discharge measurements made by the Stone & Webster Engineering Corporation have been furnished to the United States Geological Survey for publication.

Discharge measurements of Truckee River at Nevada-California State line, for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 25	F. C. Schafer	115	414	3.40	1,280
Apr. 9	Stone & Webster Engineering Corporation	.....	487	4.11	2,020
May 7	.....do	.....	375	3.30	1,200
July 1	.....do	.....	348	2.92	815
30	.....do	.....	342	2.95	828
Aug 29	.....do	.....	283	2.47	479
Aug. 30	F. C. Schafer	112	309	2.70	683
Oct. 16	H. D. McGlashan	111	275	2.36	454
Nov. 13	Stone & Webster Engineering Corporation	.....	278	2.35	420
25	.....do	.....	298	2.54	540
Dec. 16	D. S. Stuver	112	298	2.44	505

Daily gage height, in feet, of Truckee River at Nevada-California State line, for 1910.

[E. C Bigelow, jr., observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.7	3.4	3.3	3.2	4.1	3.4	2.8	2.9	2.6	2.4	2.3	2.3
2	3.6	3.4	3.3	3.3	4.0	3.3	2.8	2.9	2.6	2.4	2.2	2.3
3	3.5	2.7	3.5	3.4	3.7	3.2	2.8	2.8	2.6	2.4	2.2	2.4
4	3.4	3.1	3.6	3.6	3.6	3.2	2.8	2.8	2.6	2.5	2.2	2.5
5	3.4	3.1	3.7	3.8	3.5	3.1	2.9	2.8	2.6	2.5	2.2	2.5
6	3.4	3.2	3.8	3.8	3.5	2.9	2.8	2.8	2.6	2.3	2.2	2.5
7	3.3	3.3	3.8	3.9	3.5	2.9	2.8	2.8	2.6	2.5	2.2	2.5
8	3.3	3.3	3.8	4.0	3.5	3.0	2.7	2.8	2.6	2.4	2.2	2.5
9	3.3	3.3	3.8	4.0	3.5	3.0	2.7	2.8	2.5	2.4	2.3	2.5
10	3.2	3.3	4.0	4.1	3.6	3.4	2.8	2.8	2.5	2.4	2.3	2.6
11	3.2	3.3	4.0	4.2	3.6	3.3	2.8	2.8	2.5	2.5	2.3	2.7
12	3.3	3.3	4.1	3.9	3.6	3.3	2.8	2.8	2.5	2.4	2.5	2.7
13	3.3	3.3	4.1	3.9	3.5	3.2	2.9	2.8	2.5	2.3	2.4	2.6
14	3.2	3.3	3.9	3.9	3.6	3.2	3.0	2.8	2.5	2.3	2.4	2.5
15	3.3	3.4	3.6	3.9	3.7	3.1	3.0	2.8	2.6	2.3	2.3	2.5
16	3.4	3.3	3.6	4.0	3.6	3.0	3.0	2.8	2.5	2.3	2.3	2.4
17	3.3	3.3	3.8	4.1	3.6	3.0	3.0	2.8	2.5	2.2	2.2	2.5
18	3.3	3.3	4.3	4.2	3.6	3.0	3.0	2.8	2.5	2.2	2.2	2.5
19	3.3	3.2	5.4	4.2	3.5	3.0	2.9	2.7	2.5	2.2	2.2	2.5
20	3.3	3.3	4.9	4.2	3.5	2.8	2.9	2.7	2.4	2.2	2.3	2.4
21	3.3	3.3	4.3	4.1	3.4	2.8	2.6	2.7	2.4	2.2	2.3	2.4
22	3.4	3.3	4.0	4.2	3.4	2.8	2.6	2.7	2.4	2.2	2.3	2.4
23	3.5	3.2	3.8	4.3	3.5	2.8	2.6	2.7	2.2	2.2	2.3	2.3
24	3.4	3.2	3.5	4.3	3.5	3.0	3.1	2.7	2.3	2.2	2.4	2.3
25	3.4	3.3	3.3	4.3	3.4	3.1	3.0	2.7	2.3	2.2	2.4	2.3
26	3.4	3.3	3.1	4.4	3.5	3.2	3.0	2.7	2.3	2.3	2.4	2.3
27	3.4	3.3	3.1	4.5	3.5	3.2	2.9	2.7	2.5	2.3	2.4	2.2
28	3.4	3.3	3.1	4.7	3.5	3.1	2.9	2.6	2.4	2.2	2.3	2.2
29	3.4	.....	3.0	4.4	3.5	2.8	2.9	2.6	2.3	2.3	2.3	2.2
30	3.4	.....	3.2	4.4	3.4	3.0	2.9	2.6	2.4	2.3	2.3	2.2
31	3.4	.....	3.2	.....	3.4	.....	2.9	2.6	.....	2.3	.....	2.3

Daily discharge, in second-feet, of Truckee River at Nevada-California State line for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	735	1,310	1,210	1,060	2,040	1,260	703	786	562	457	418	418
2	1,510	1,310	1,210	1,160	1,920	1,160	703	786	562	457	385	418
3	1,410	735	1,410	1,260	1,580	1,060	703	703	562	457	385	457
4	1,310	1,030	1,510	1,470	1,470	1,060	703	703	562	504	385	504
5	1,310	1,030	1,620	1,690	1,360	964	786	703	562	504	385	504
6	1,310	1,120	1,730	1,690	1,360	786	703	703	562	418	385	504
7	1,210	1,210	1,730	1,800	1,360	786	703	703	562	504	385	504
8	1,210	1,210	1,730	1,920	1,360	873	628	703	562	457	385	504
9	1,210	1,210	1,730	1,920	1,360	873	628	703	504	457	418	504
10	1,120	1,210	1,970	2,040	1,470	1,260	703	703	504	457	418	562
11	1,120	1,210	1,970	2,160	1,470	1,160	703	703	504	504	418	628
12	1,210	1,210	2,090	1,800	1,470	1,160	703	703	504	457	504	628
13	1,210	1,210	2,090	1,800	1,360	1,060	786	703	504	418	457	562
14	1,120	1,210	1,850	1,800	1,470	1,060	873	703	504	418	457	504
15	1,210	1,310	1,510	1,800	1,580	964	873	703	562	418	418	504
16	1,310	1,210	1,510	1,920	1,470	873	873	703	504	418	418	457
17	1,210	1,210	1,730	2,040	1,470	873	873	703	504	385	385	504
18	1,210	1,210	2,350	2,160	1,470	873	873	703	504	385	385	504
19	1,210	1,120	3,890	2,160	1,360	873	786	628	504	385	385	504
20	1,210	1,210	3,080	2,160	1,360	703	786	628	457	385	418	457
21	1,210	1,210	2,290	2,040	1,260	703	562	628	457	385	418	457
22	1,310	1,210	1,920	2,160	1,260	703	562	628	457	385	418	457
23	1,410	1,120	1,690	2,290	1,360	703	562	628	385	385	418	418
24	1,310	1,120	1,360	2,290	1,360	873	964	628	418	385	457	418
25	1,310	1,210	1,160	2,290	1,260	964	873	628	418	385	457	418
26	1,310	1,210	964	2,420	1,360	1,060	873	628	418	418	457	418
27	1,310	1,210	964	2,550	1,360	1,060	786	628	504	418	457	385
28	1,310	1,210	964	2,810	1,360	964	786	562	457	385	418	385
29	1,310	.....	873	2,420	1,360	703	786	562	418	418	418	385
30	1,310	.....	1,060	2,420	1,260	873	786	562	457	418	418	385
31	1,310	.....	1,060	.....	1,260	.....	786	562	.....	418	.....	418

NOTE.—Daily discharge determined from two discharge rating curves, one applicable Jan. 1 to Mar. 19, and the other Mar. 20 to Dec. 31; well defined above 700 second-feet.

Monthly discharge of Truckee River at Nevada-California State line for 1910.

[Drainage area, 955 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	1,510	735	1,250	1.31	1.51	76,900	B.
February	1,310	735	1,180	1.24	1.29	65,500	B.
March	3,890	873	1,680	1.76	2.03	103,000	B.
April	2,810	1,060	1,980	2.07	2.31	118,000	A.
May	2,040	1,260	1,430	1.50	1.73	87,900	B.
June	1,260	703	943	.988	1.10	56,100	B.
July	964	562	755	.791	.91	46,400	B.
August	786	562	668	.699	.81	41,100	B.
September	562	385	498	.521	.58	29,600	B.
October	504	385	427	.447	.52	26,300	C.
November	504	385	418	.438	.49	24,900	C.
December	628	385	473	.495	.57	29,100	B.
The year	3,890	385	974	1.02	13.85	705,000	

TRUCKEE RIVER AT RENO, NEV.

This station, which is located in the city of Reno, in SE. ¼ sec. 11, T. 19 N., R. 19 E., about 12 miles below the California-Nevada line, near the upper end of Truckee Meadows, was established July 1, 1906, by the United States Weather Bureau in connection with its measurements of snowfall in the high Sierra, and gage heights have been furnished by that bureau.

The station is above all return waters and below practically all tributaries except Steamboat Creek, which enters from the south 6 miles below.

The datum of the staff gage is 4,481.60 feet above sea level and has remained unchanged.

Discharge measurements are made from the Rock Street Bridge, about 800 feet downstream from the Virginia Street Bridge, where the vertical staff gage is located. Low-water measurements are made by wading.

This station is maintained in cooperation with the United States Reclamation Service and the United States Weather Bureau.

The stream bed is permanent. The relation between gage height and discharge is unaffected by ice, and the records are considered good. The discharge of the river is affected by storage and regulation at several power plants above the station.

Discharge measurements of Truckee River at Reno, Nev., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 25	F. C. Schafer	120	430	2.70	1,280
Aug. 29	....do	119	344	1.40	324
Oct. 16	H. D. McGlashan	102	310	1.38	336
Dec. 10	D. S. Stuver	118	377	1.90	618

Daily gage height, in feet, of Truckee River at Reno, Nev., for 1910.

[United States Weather Bureau, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	2.7	2.8	3.0	3.1	2.3	1.1	1.5	1.4	1.4	1.3	1.5
2	2.9	2.7	2.9	3.2	2.9	2.3	1.1	1.5	1.5	1.4	1.2	1.5
3	2.8	2.6	2.9	3.1	2.8	2.3	1.1	1.5	1.5	1.4	1.4	1.6
4	2.7	2.6	3.0	3.1	2.7	2.0	1.7	1.5	1.5	1.4	1.4	2.0
5	2.6	2.6	3.1	3.2	2.4	1.9	1.8	1.5	1.5	1.4	1.4	1.8
6	2.6	2.6	3.2	3.2	2.4	1.6	1.8	1.5	1.5	1.4	1.4	1.6
7	2.6	2.6	3.2	3.2	2.3	1.6	1.7	1.5	1.5	1.4	1.4	1.6
8	2.6	2.6	3.2	3.4	2.7	1.6	1.8	1.5	1.5	1.4	1.4	1.6
9	2.6	2.5	3.3	3.5	2.9	1.5	1.8	1.5	1.5	1.4	1.5	1.6
10	2.6	2.5	3.3	3.5	3.0	1.5	1.8	1.5	1.4	1.3	1.5	1.9
11	2.5	2.5	3.4	3.5	3.0	1.5	1.8	1.5	1.4	1.3	1.5	2.4
12	2.5	2.5	3.5	3.3	2.9	1.5	1.8	1.4	1.4	1.3	1.3	2.0
13	2.5	2.5	3.6	3.3	2.8	2.0	1.8	1.4	1.4	1.3	1.5	1.8
14	2.6	2.8	3.2	3.3	2.8	1.4	1.5	1.5	1.3	1.4	1.5	1.7
15	2.6	2.5	3.2	3.2	2.8	1.4	1.5	1.4	1.4	1.4	1.5	1.6
16	2.5	2.5	3.2	3.2	2.8	1.3	1.5	1.5	1.5	1.5	1.5	1.6
17	2.5	2.5	3.1	3.2	2.6	1.2	1.8	1.5	1.5	1.5	1.5	1.6
18	2.5	2.5	3.8	3.3	2.5	1.2	1.8	1.5	1.5	1.4	1.4	1.6
19	2.5	2.5	4.3	3.5	2.5	1.2	2.0	1.5	1.5	1.4	1.3	1.6
20	2.5	2.5	4.2	3.6	2.5	1.4	2.1	1.5	1.5	1.4	1.3	1.5
21	2.5	2.5	3.8	3.4	2.5	1.2	2.0	1.5	1.4	1.5	1.4	1.5
22	2.7	2.5	3.4	3.3	2.6	1.2	1.5	1.4	1.4	1.5	1.5	1.5
23	2.7	2.5	3.3	3.4	2.6	1.1	1.5	1.5	1.4	1.6	1.6	1.5
24	2.8	2.5	3.1	3.4	2.6	1.1	1.5	1.5	1.3	1.5	1.6	1.5
25	2.8	2.5	2.7	3.4	2.5	1.1	1.7	1.5	1.3	1.5	1.5	1.5
26	2.7	2.5	2.7	3.5	2.4	1.1	1.7	1.5	1.3	1.4	1.5	1.5
27	2.7	2.5	2.7	3.8	2.4	1.8	1.6	1.5	1.4	1.4	1.5	1.5
28	2.7	2.6	2.7	3.8	2.4	1.3	1.7	1.5	1.4	1.3	1.5	1.5
29	2.7	.....	2.7	3.6	2.4	1.1	1.5	1.4	1.4	1.4	1.4	1.4
30	2.7	.....	2.7	3.3	2.4	1.2	1.6	1.5	1.4	1.4	1.5	1.4
31	2.7	.....	2.8	.....	2.4	.....	1.5	1.5	.....	1.3	.....	1.5

Daily discharge, in second-feet, of Truckee River at Reno, Nev., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,630	1,320	1,420	1,630	1,740	940	215	388	338	338	293	388
2	1,520	1,320	1,520	1,850	1,520	940	215	388	388	338	250	388
3	1,420	1,220	1,520	1,740	1,420	940	215	388	388	338	338	441
4	1,320	1,220	1,630	1,740	1,320	700	500	388	388	338	338	700
5	1,220	1,220	1,740	1,850	1,030	630	562	388	388	338	338	562
6	1,220	1,220	1,850	1,850	1,030	441	562	388	388	338	338	441
7	1,220	1,220	1,850	1,850	940	441	500	388	388	338	338	441
8	1,220	1,220	1,850	2,070	1,320	441	562	388	388	338	338	441
9	1,220	1,120	1,960	2,200	1,520	388	562	388	388	338	388	441
10	1,220	1,120	1,960	2,200	1,630	388	562	388	338	293	388	630
11	1,120	1,120	2,070	2,200	1,630	388	562	388	338	293	388	1,030
12	1,120	1,120	2,200	1,960	1,520	388	562	338	338	293	293	700
13	1,120	1,120	2,330	1,960	1,420	700	562	338	338	293	388	562
14	1,220	1,420	1,850	1,960	1,420	338	388	388	293	338	388	500
15	1,220	1,120	1,850	1,850	1,420	338	388	338	338	338	388	441
16	1,120	1,120	1,850	1,850	1,420	293	388	388	388	388	388	441
17	1,120	1,120	1,740	1,850	1,220	250	562	388	388	388	388	441
18	1,120	1,120	2,600	1,960	1,120	250	562	388	388	338	338	441
19	1,120	1,120	3,360	2,200	1,120	250	700	388	388	338	293	441
20	1,120	1,120	3,200	2,330	1,120	338	780	388	388	338	293	388
21	1,120	1,120	2,600	2,070	1,120	250	700	388	338	388	338	388
22	1,320	1,120	2,070	1,960	1,220	250	388	338	338	388	388	388
23	1,320	1,120	1,960	2,070	1,220	215	388	388	338	441	441	388
24	1,420	1,120	1,740	2,070	1,220	215	388	388	293	388	441	388
25	1,420	1,120	1,320	2,070	1,120	215	500	388	293	388	388	388
26	1,320	1,120	1,320	2,200	1,030	215	500	388	293	338	388	388
27	1,320	1,120	1,320	2,600	1,030	562	441	388	338	338	388	388
28	1,320	1,220	1,320	2,600	1,030	293	500	388	338	293	388	388
29	1,320	.....	1,320	2,330	1,030	215	388	338	338	338	338	338
30	1,320	.....	1,320	1,960	1,030	250	441	388	338	338	388	338
31	1,320	.....	1,420	.....	1,030	.....	388	388	.....	293	.....	388

NOTE.—Daily discharges determined from a discharge rating curve well defined for all stages.

Monthly discharge of Truckee River at Reno, Nev., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	1,630	1,120	1,260	77,500	A.
February	1,420	1,120	1,170	65,000	A.
March	3,360	1,320	1,870	115,000	A.
April	2,600	1,630	2,030	121,000	A.
May	1,740	940	1,260	77,500	A.
June	940	215	415	24,700	A.
July	780	215	482	29,600	A.
August	388	338	380	23,400	A.
September	388	293	354	21,100	A.
October	441	293	342	21,000	A.
November	441	250	359	21,400	A.
December	1,030	338	465	28,600	A.
The year	3,360	215	864	626,000	

TRUCKEE RIVER AT CLARKS, NEV.

This station, which is located in the SE. ¼ sec. 26, T. 20 N., R. 22 E., at the highway bridge about 600 feet from the Southern Pacific Railroad station at Clarks, was established August 1, 1910, to replace the station formerly maintained at Derby dam.

The gage is a vertical rod fastened to the south abutment of the bridge.

Discharge measurements are made from the bridge.

The river is regulated by storage and power plants above the station. Water is diverted above the gage for irrigation in Truckee Valley.

This station is maintained by the United States Reclamation Service. Discharge measurements are made and furnished by the Stone & Webster Engineering Corporation.

Discharge measurements of Truckee River at Clarks, Nev., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 1	Stone & Webster Engineering Corporation	64	324	2.80	431
28	do	64	304	2.51	342

Daily gage height, in feet, and discharge, in second-feet, of Truckee River at Clarks, Nev., for 1910.

[E. R. Dack, observer.]

Day.	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	2.7	420	2.6	380	2.6	380	2.8	460	2.9	500
2	2.7	420	2.6	380	2.6	380	2.7	420	2.9	500
3	2.7	420	2.6	380	2.5	350	2.6	380	3.4	730
4	2.7	420	2.6	380	2.6	380	2.6	380	3.8	960
5	2.7	420	3.2	630	2.7	420	2.6	380	3.2	630
6	2.6	380	3.0	540	2.6	380	2.6	380	3.2	630
7	2.6	380	3.0	540	2.7	420	2.7	420	3.1	580
8	2.7	420	2.6	380	2.6	380	2.7	420	3.2	630
9	2.7	420	2.6	380	2.6	380	2.7	420	3.1	580
10	2.7	420	2.6	380	2.5	350	2.7	420	3.2	630
11	2.7	420	2.5	350	2.6	380	2.7	420	4.2	1,210
12	2.6	380	2.5	350	2.8	460	2.7	420	3.6	840
13	2.7	420	2.4	320	2.7	420	3.1	580	3.4	730
14	2.7	420	2.5	350	2.8	460	3.0	540	3.3	680
15	2.8	460	2.6	380	3.0	540	2.8	460	3.1	580
16	2.7	420	3.0	540	2.9	500	2.8	460	3.1	580
17	2.7	420	2.8	460	2.9	500	2.8	460	3.1	580
18	2.7	420	2.7	420	2.8	460	2.8	460	3.1	580
19	2.7	420	2.7	420	2.7	420	2.7	420	3.1	580
20	2.7	420	2.7	420	2.7	420	2.7	420	3.0	540
21	2.7	420	2.7	420	2.8	460	2.7	420	3.0	540
22	2.7	420	2.6	380	2.8	460	2.7	420	2.8	460
23	2.7	420	2.6	380	2.8	460	2.7	420	2.7	420
24	2.7	420	2.5	350	2.8	460	2.8	460	2.7	420
25	2.7	420	2.5	350	2.7	420	3.2	630	2.7	420
26	2.7	420	2.4	320	2.7	420	3.1	580	2.7	420
27	2.6	380	2.5	350	2.7	420	3.0	540	2.7	420
28	2.6	380	2.5	350	2.7	420	2.9	500	2.6	380
29	2.6	380	2.6	380	2.7	420	2.9	500	2.7	420
30	2.6	380	2.6	380	2.7	420	2.9	500	2.9	500
31	2.6	380	.....	.....	2.8	460	.....	.....	2.9	500

NOTE.—Daily discharges determined from a discharge rating curve well defined for all stages.

Monthly discharge of Truckee River at Clarks, Nev., for 1910.

[Drainage area, 1,740 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
August	460	380	411	0.236	0.27	25,300	A.
September	630	320	401	.230	.26	23,900	A.
October	540	350	426	.245	.28	26,200	A.
November	630	380	456	.262	.29	27,100	A.
December	1,210	380	586	.337	.39	36,000	A.

TRUCKEE RIVER AT DERBY DAM, NEV.

This station, which is located about 2 miles east of Clarks, Nev., three-fourths of a mile above the Reclamation Service diversion dam for the main canal of the Truckee-Carson project, was established July 1, 1907, to determine the amount of water available for the

canal and the amount in excess of the requirements of the water users in the Wadsworth Valley, and was discontinued June 6, 1910, in favor of the station at Clarks. The station replaced the station at Vista, giving practically the same record.

The station is equipped with an inclined staff gage in two sections, the datum of which has remained unchanged, and a cable and car from which discharge measurements are made.

The relation between gage heights and discharge at this point was at times evidently affected by backwater. The river is regulated by storage and power plants above the station. Water is diverted above the gage for irrigation in Truckee Valley.

The station was maintained by the United States Reclamation Service.

The following discharge measurement was made by F. C. Schafer:

March 26, 1910: Width, 115 feet; area, 438 square feet; gage height, 6.00 feet; discharge 1,780 second-feet.

Daily gage height, in feet, of Truckee River at Derby dam, Nev., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	5.6	5.8	5.8	5.9	6.5	5.7
2	6.8	5.8	6.0	6.3	6.4	5.6
3	6.7	6.0	6.2	6.4	6.0	5.5
4	5.9	6.0	6.2	6.2	5.9	5.4
5	5.8	5.8	6.3	6.2	5.4	5.1
6	5.8	5.8	6.4	6.9	5.4	4.9
7	5.75	6.0	6.5	6.6	5.9	.....
8	5.8	6.0	6.6	6.5	6.0	.....
9	5.65	6.0	6.7	6.9	6.4	.....
10	5.8	6.0	6.7	6.7	6.4	.....
11	5.9	6.0	6.7	6.8	6.8	.....
12	5.8	6.0	6.7	6.5	6.8	.....
13	5.8	6.0	6.75	6.6	6.4	.....
14	5.8	6.4	6.9	6.6	6.4	.....
15	5.8	6.5	6.7	6.4	6.2	.....
16	5.8	6.5	6.4	6.2	6.0	.....
17	5.9	6.2	6.0	6.8	5.8	.....
18	5.85	6.0	6.0	6.9	5.6	.....
19	5.85	5.9	7.3	7.1	5.6	.....
20	5.85	5.5	8.5	6.9	5.7	.....
21	5.8	5.5	7.3	7.0	5.7	.....
22	5.75	5.5	6.6	6.8	5.6	.....
23	5.8	5.5	6.6	7.0	5.7	.....
24	5.8	5.6	6.0	6.9	5.8	.....
25	5.8	6.0	5.9	6.8	6.1	.....
26	5.75	5.8	5.7	7.0	6.0	.....
27	5.6	5.7	5.6	7.1	5.9	.....
28	5.75	5.6	5.6	7.0	5.8	.....
29	5.75	.....	5.6	6.9	5.8	.....
30	5.75	.....	5.4	6.8	5.8	.....
31	5.8	.....	5.6	.....	5.8	.....

Daily discharge, in second-feet, of Truckee River at Derby dam, Nev., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	1,220	1,340	1,340	1,410	1,840	1,280
2	2,070	1,340	1,480	1,700	1,770	1,220
3	2,000	1,480	1,620	1,770	1,480	1,150
4	1,410	1,480	1,620	1,620	1,410	1,090
5	1,340	1,340	1,700	1,620	1,090	910
6	1,340	1,340	1,770	2,150	1,090	800
7	1,310	1,480	1,840	1,920	1,410	.....
8	1,340	1,480	1,920	1,840	1,480	.....
9	1,250	1,480	2,000	2,150	1,770	.....
10	1,340	1,480	2,000	2,000	1,770	.....
11	1,410	1,480	2,000	2,070	2,070	.....
12	1,340	1,480	2,000	1,840	2,070	.....
13	1,340	1,480	2,030	1,920	1,770	.....
14	1,340	1,770	2,150	1,920	1,770	.....
15	1,340	1,840	2,000	1,770	1,620	.....
16	1,340	1,840	1,770	1,620	1,480	.....
17	1,410	1,620	1,480	2,070	1,340	.....
18	1,380	1,480	1,480	2,150	1,220	.....
19	1,380	1,410	2,470	2,310	1,220	.....
20	1,380	1,150	3,440	2,150	1,280	.....
21	1,340	1,150	2,470	2,230	1,280	.....
22	1,310	1,150	1,920	2,070	1,220	.....
23	1,340	1,150	1,920	2,230	1,280	.....
24	1,340	1,220	1,480	2,150	1,340	.....
25	1,340	1,480	1,410	2,070	1,550	.....
26	1,310	1,340	1,280	2,230	1,480	.....
27	1,220	1,280	1,220	2,310	1,410	.....
28	1,310	1,220	1,220	2,230	1,340	.....
29	1,310	.....	1,220	2,150	1,340	.....
30	1,310	.....	1,090	2,070	1,340	.....
31	1,340	.....	1,220	.....	1,340	.....

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined for 1907–1909, but defined during 1910 by only one measurement which does not plot on the curve.

Monthly discharge of Truckee River at Derby dam, Nev., for 1910.

[Drainage area, 1,740 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	2,070	1,220	1,380	0.794	0.92	84,800	B.
February	1,840	1,150	1,420	.816	.85	78,900	B.
March	3,440	1,090	1,760	1.01	1.16	108,000	B.
April	2,310	1,410	1,990	1.14	1.27	118,000	B.
May	2,070	1,090	1,480	.851	.98	91,000	B.
June (1–6)	1,280	800	1,080	.621	.14	12,800	B.
The period	.....	.....	.....	.....	.....	494,000	

DONNER CREEK NEAR TRUCKEE, CAL.

Donner Creek flows from the east end of Donner Lake eastward into Truckee River about 1½ miles above Truckee, Cal., its length being about 2 miles.

The gaging station, which is located 150 feet below the dam of the Donner Creek Ice Co., 1½ miles west of Truckee, Cal., and below the mouth of Cold Creek, the principal tributary, was established October

23, 1902, to determine the amount of water available for storage in Donner Lake for use on the Truckee-Carson project.

Four different gages were used during 1909. Previous to June 1 all gage heights are referred to the datum of the old gage. Beginning June 1, 1909, they refer to a permanent inclined gage installed September 12, 1909, about 40 feet downstream from the old gage.

Discharge measurements are made from a cable and car.

The relation between gage height and discharge is probably not greatly affected by ice, but it is affected by the raising and lowering of the gates of the storage dam at the outlet of Donner Lake.

The record is considered reliable.

This station is maintained in cooperation with the United States Reclamation Service.

Discharge measurements of Donner Creek near Truckee, Cal., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 21	F. C. Schafer	45	97	1.00	228
Aug. 20[a]	do	5	1.8	.00	1.4
Sept. 20[a]	T. W. Norcross	4	1.5	.13	2.6
Dec. 14[a]	D. S. Stuver	40	45	.42	20.3

[a] Wading measurement.

Daily gage height, in feet, of Donner Creek near Truckee, Cal., for 1910.

[W. O. Blinn, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.9	0.85	0.85	1.3	1.8	1.3	0.4	0.1	0.0	0.1	0.05	0.4
2	.9	.85	.85	1.3	1.6	1.3	.4	.1	.0	.1	.0	.3
3	.8	.85	.9	1.3	1.5	1.2	.4	.1	.0	.1	.0	.3
4	.8	.85	1.05	1.3	1.45	1.1	.4	.0	.0	.1	.0	.3
5	.8	.85	1.0	1.35	1.4	1.05	.4	.1	.0	.1	.0	.3
6	.8	.85	1.05	1.4	1.4	.85	.4	.0	.0	.1	.0	.3
7	.7	.85	1.1	1.4	1.5	.85	.4	.0	.0	.1	.0	.4
8	.8	.85	1.1	1.4	1.5	.8	.3	.0	.0	.1	.0	.4
9	.8	.85	1.1	1.55	1.5	.8	.3	.0	.0	.1	.3	.5
10	.8	1.0	1.15	1.6	1.6	.8	.3	.0	.0	.1	.2	.7
11	.8	1.0	1.2	1.6	1.7	.8	.3	.0	.0	.1	.2	.7
12	.8	1.4	1.25	1.5	1.7	.75	.3	.05	.0	.1	.1	.6
13	.8	1.15	1.3	1.6	1.7	.75	.3	.05	.0	.1	.0	.55
14	.8	1.0	1.3	1.6	1.7	.7	.3	.0	.0	.1	.0	.45
15	.8	.95	1.3	1.6	1.5	.7	.2	.0	.1	.1	.1	.4
16	.8	.9	1.3	1.65	1.5	.7	.2	.0	.1	.1	.1	.4
17	.8	.85	1.3	1.7	1.5	.7	.2	.0	.1	.1	.1	.4
18	.8	.85	1.35	1.7	1.55	.7	.15	.0	.1	.1	.15	.4
19	.8	.85	1.7	1.7	1.6	.7	.2	.0	.1	.1	.2	.4
20	.8	.8	1.75	1.8	1.6	.7	.15	.0	.1	.1	.2	.4
21	.9	.8	1.65	1.7	1.5	.65	.2	.0	.1	.1	.2	.4
22	1.1	.8	1.6	1.9	1.5	.6	.15	.0	.1	.1	.2	.4
23	1.1	.8	1.5	1.9	1.55	.55	.2	.0	.1	.1	.2	.4
24	1.05	.75	1.4	1.9	1.55	.5	.1	.0	.1	.1	.5	.4
25	1.0	.75	1.35	2.0	1.5	.5	.1	.0	.1	.1	.45	.4
26	.9	.75	1.3	2.0	1.45	.5	.1	.0	.1	.1	.4	.4
27	.9	.75	1.3	2.0	1.4	.5	.1	.0	.1	.1	.4	.4
28	.9	.8	1.3	2.0	1.4	.5	.1	.0	.1	.1	.5	.4
29	.9	.....	1.2	2.0	1.4	.4	.5	.0	.1	.1	.4	.4
30	.9	.....	1.2	1.9	1.4	.4	.45	.0	.1	.1	.4	.4
31	.9	.....	1.25	.....	1.4	.....	.1	.0	.....	.1	.....	.4

Daily discharge, in second-feet, of Donner Creek near Truckee, Cal., for 1909 and 1910.

Day.	Jan.	Nov.	Dec.	Day.	Jan.	Nov.	Dec.	Day.	Jan.	Nov.	Dec.
1909.											
1		4	862	11		4	215	21	574	255	93
2		4	674	12		4	202	22	410	315	70
3		4	447	13		4	202	23	288	345	50
4		4	447	14	326	4	190	24	43	489	50
5		4	326	15	652	4	177	25	43	447	50
6		4	326	16	812	4	153	26	43	365	50
7		4	308	17	752	4	142	27	43	290	50
8		4	290	18	752	4	131	28	43	290	50
9		4	274	19	652	106	93	29	43	326	50
10		4	257	20	612	230	93	30	34	674	50
								31	34		63

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	77	70	70	153	290	153	18	2.5	1.2	2.5	1.8	18
2	77	70	70	153	228	153	18	2.5	1.2	2.5	1.2	11
3	63	70	77	153	202	131	18	2.5	1.2	2.5	1.2	11
4	63	70	192	153	190	111	18	1.2	1.2	2.5	1.2	11
5	63	70	93	165	177	102	18	2.5	1.2	2.5	1.2	11
6	63	70	102	177	177	70	18	1.2	1.2	2.5	1.2	11
7	50	70	111	177	202	70	18	1.2	1.2	2.5	1.2	18
8	63	70	111	177	202	63	11	1.2	1.2	2.5	1.2	18
9	63	70	111	215	202	63	11	1.2	1.2	2.5	11	27
10	63	93	121	228	228	63	11	1.2	1.2	2.5	5.5	50
11	63	93	131	228	257	63	11	1.2	1.2	2.5	5.5	50
12	63	177	142	202	257	56	11	1.8	1.2	2.5	2.5	38
13	63	121	153	228	257	56	11	1.8	1.2	2.5	1.2	32
14	63	93	153	228	257	50	11	1.2	1.2	2.5	1.2	22
15	63	85	153	228	202	50	5.5	1.2	2.5	2.5	2.5	18
16	63	77	153	242	202	50	5.5	1.2	2.5	2.5	2.5	18
17	63	70	153	257	202	50	5.5	1.2	2.5	2.5	2.5	18
18	63	70	165	257	215	50	4.0	1.2	2.5	2.5	4.0	18
19	63	70	257	257	228	50	5.5	1.2	2.5	2.5	5.5	18
20	63	63	274	290	228	50	4.0	1.2	2.5	2.5	5.5	18
21	77	63	242	257	202	44	5.5	1.2	2.5	2.5	5.5	18
22	111	63	228	326	202	38	4.0	1.2	2.5	2.5	5.5	18
23	111	63	202	326	215	32	5.5	1.2	2.5	2.5	5.5	18
24	102	56	177	326	215	27	2.5	1.2	2.5	2.5	27	18
25	93	56	165	365	202	27	2.5	1.2	2.5	2.5	22	18
26	77	56	153	365	190	27	2.5	1.2	2.5	2.5	18	18
27	77	56	153	365	177	27	2.5	1.2	2.5	2.5	18	18
28	77	63	153	365	177	27	2.5	1.2	2.5	2.5	27	18
29	77	.....	131	365	177	18	27	1.2	2.5	2.5	18	18
30	77	.....	131	326	177	18	22	1.2	2.5	2.5	18	18
31	77	.....	142	.....	177	.....	2.5	1.2	.....	2.5	.....	18

NOTE.—Table of daily discharge for 1909 supersedes that published in Water-Supply Paper 270; an error discovered in the data for January, 1909, is here corrected; discharge determined from a revised curve fairly well defined for period after Nov. 23. Daily discharge for 1910 determined from a discharge rating curve fairly well defined for all stages.

Monthly discharge of Donner Creek near Truckee, Cal., for 1909 and 1910.

[Drainage area, 30 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1909.							
January	812	8	214	7.13	8.22	13,200	B.
February	43	30	38.2	1.27	1.32	2,120	B.
March	62	43	51.0	1.70	1.96	3,140	A.
April	276	52	150	5.00	5.58	8,930	A.
May	410	196	264	8.80	10.14	16,200	B.
June	285	58	176	5.87	6.55	10,500	B.
July	180	23	69.2	2.31	2.66	4,250	A.
August	20	7	11.8	.393	.45	726	D.
September	7	1	4.9	.163	.18	292	D.
October	7	1	3.4	.113	.13	209	D.
November	674	4	140	4.67	5.21	8,330	C.
December	862	50	208	6.93	7.99	12,800	B.
The year	862	1	111	3.70	50.39	80,700	
1910.							
January	111	50	72.0	2.40	2.77	4,430	C.
February	177	56	75.6	2.52	2.62	4,200	C.
March	274	70	148	4.93	5.69	9,100	B.
April	365	153	252	8.40	9.37	15,000	B.
May	290	177	210	7.00	8.07	12,900	B.
June	153	18	59.6	1.99	2.22	3,550	B.
July	27	2.5	10.1	.337	.39	621	C.
August	2.5	1.2	1.41	.047	.05	86.7	D.
September	2.5	1.2	1.89	.063	.07	112	D.
October	2.5	2.5	2.50	.083	.10	154	D.
November	27	1.2	7.47	.249	.28	444	D.
December	50	11	20.5	.683	.79	1,260	C.
The year	365	1.2	71.6	2.39	32.42	51,900	

NOTE.—Data for January, November, and December, 1909, supersede those published in Water-Supply Paper 270.

PROSSER CREEK NEAR HOBART MILLS, CAL.

Prosser Creek, a stream about 14 miles long, enters Truckee River from the west about 2 miles southwest of Boca.

The gaging station, which is located just below Alder Creek, about 2 miles above the mouth of Prosser Creek, 4 miles north of Truckee, and 3 miles below Hobart Mills, Cal., was established June 27, 1903, discontinued October 15, 1904, and reestablished September 23, 1907. Some miscellaneous measurements were made at this point in the meantime.

The present gage is painted on the northeast iron pier of the bridge, and has been used since January 15, 1909.

Discharge measurements are made from a wagon bridge or by means of a car and cable 150 feet below the bridge.

The section is subject to change between floods, and the relation between gage height and discharge is at times affected by ice.

This station is maintained in cooperation with the United States Reclamation Service.

Discharge measurements of Prosser Creek near Hobart Mills, Cal., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 21	F. C. Schafer	54	85.5	4.00	308
Aug. 26	do[a]	16.5	10.7	2.10	10
Sept. 21	T. W. Norcross[a]	.....	.....	[b].89	[c] 16.6
Dec. 15	D. S. Stuver[a]	45	48.1	2.62	34.4

[a] Wading measurement.
[b] Refers to Stone and Webster gage at cable 150 feet below the regular gage at the bridge. Bridge gage not readable.
[c] Measurement was made above Alder Creek, which was carrying 3.5 second-feet; but it is included in above discharge.

Daily gage height, in feet, of Prosser Creek near Hobart Mills, Cal., for 1910.

[A. A. Wilcox, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.9	3.75	3.5	3.65	3.9	3.8	2.85	2.1	2.1	2.1	2.1	2.3
2	3.8	3.85	3.35	3.7	3.85	3.8	2.8	2.1	2.1	2.1	2.2	2.3
3	3.8	3.85	3.25	3.8	3.8	3.7	2.7	2.1	2.1	2.1	2.2	2.5
4	3.85	3.8	3.25	3.75	3.75	3.75	2.7	2.1	2.1	2.1	2.2	2.6
5	3.8	3.8	3.4	3.75	3.55	3.7	2.7	2.1	2.1	2.1	2.2	2.5
6	3.9	3.8	3.45	3.75	3.5	3.7	2.7	2.1	2.1	2.1	2.2	2.4
7	3.9	3.8	3.45	3.95	3.5	3.65	2.7	2.1	2.1	2.1	2.2	2.4
8	3.8	3.8	3.4	4.05	3.6	3.6	2.7	2.1	2.1	2.1	2.2	2.3
9	3.8	3.7	3.4	4.05	3.75	3.6	2.6	2.1	2.1	2.1	2.25	2.4
10	3.8	3.7	3.4	4.05	3.8	3.6	2.6	2.1	2.1	2.1	2.3	2.5
11	3.8	3.7	3.55	4.05	3.85	3.6	2.6	2.1	2.1	2.1	2.3	2.7
12	3.75	3.75	3.6	4.05	3.8	3.55	2.5	2.1	2.1	2.1	2.4	2.5
13	3.75	3.75	3.75	3.95	3.75	3.55	2.5	2.1	2.1	2.1	2.3	2.5
14	3.7	3.75	3.8	3.95	3.65	3.5	2.4	2.1	2.1	2.2	2.2	2.3
15	3.7	3.7	3.75	3.95	3.65	3.5	2.4	2.1	2.1	2.2	2.2	2.4
16	3.6	3.8	3.75	3.8	3.7	3.5	2.4	2.1	2.3	2.2	2.2	2.4
17	3.6	3.8	3.95	3.85	3.7	3.45	2.4	2.1	2.3	2.2	2.2	2.4
18	3.6	3.8	4.0	4.05	3.7	3.4	2.4	2.1	2.1	2.2	2.3	2.6
19	3.6	3.8	4.4	4.05	3.6	3.35	2.4	2.1	2.1	2.2	2.3	2.5
20	3.6	3.8	4.25	4.15	3.6	3.3	2.4	2.1	2.1	2.2	2.3	2.5
21	3.7	3.8	4.0	4.15	3.6	3.3	2.4	2.1	2.1	2.2	2.3	2.5
22	3.7	3.8	3.8	4.05	3.6	3.3	2.4	2.1	2.1	2.2	2.3	2.4
23	3.7	3.8	3.8	4.05	3.7	3.3	2.4	2.1	2.1	2.1	2.4	2.4
24	3.75	3.8	3.75	4.05	3.65	3.3	2.2	2.1	2.1	2.1	2.5	2.3
25	3.8	3.8	3.45	4.05	3.65	3.3	2.2	2.1	2.1	2.1	2.4	2.3
26	3.8	3.8	3.45	4.05	3.7	3.3	2.2	2.1	2.1	2.1	2.4	2.3
27	3.6	3.7	3.45	4.05	3.7	3.2	2.1	2.1	2.1	2.1	2.4	2.3
28	3.65	3.6	3.4	4.15	3.7	3.1	2.1	2.1	2.1	2.1	2.4	2.3
29	3.6	.....	3.4	4.05	3.7	3.0	2.0	2.1	2.1	2.1	2.4	2.4
30	3.7	.....	3.4	4.0	3.7	2.9	2.0	2.1	2.1	2.1	2.3	2.4
31	3.65	.....	3.4	.....	3.7	.....	2.0	2.1	.....	2.1	.....	2.4

NOTE.—Probably slight effect from ice the last part of December.

Daily discharge, in second-feet, of Prosser Creek near Hobart Mills, Cal., for 1909 and 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	60	89	105	114	665	483	224	76	7	20	63	480
2	67	76	97	132	640	568	188	58	7	24	63	403
3	67	89	97	151	692	524	188	52	7	30	63	305
4	67	89	105	151	692	483	178	47	10	30	63	264
5	67	70	105	151	640	524	168	47	14	30	76	227
6	114	58	97	151	640	483	168	47	14	38	76	204
7	105	52	89	151	640	483	158	38	12	38	63	204
8	96	47	97	151	581	483	158	34	12	38	63	182
9	88	42	114	172	545	503	158	30	12	38	63	182
10	114	42	114	216	545	369	139	30	14	38	63	161
11	122	38	114	264	502	352	158	24	14	38	63	161
12	140	38	114	370	480	386	158	24	14	47	63	161
13	210	34	132	440	460	386	148	24	14	47	63	151
14	347	34	132	460	460	386	158	24	14	47	63	141
15	879	58	123	480	460	369	148	17	14	47	52	141
16	1,290	89	132	523	422	352	158	17	14	47	52	141
17	764	114	123	545	422	305	148	14	20	47	52	161
18	560	123	114	665	386	276	139	14	20	47	52	161
19	393	114	132	640	386	276	139	10	20	47	63	161
20	393	105	132	480	370	276	129	10	20	47	204	161
21	470	132	123	386	353	330	129	10	20	47	900	151
22	344	141	123	386	321	330	129	10	20	47	403	141
23	298	172	114	422	321	330	129	10	17	47	305	141
24	284	172	97	386	291	330	114	10	17	52	305	123
25	246	161	89	386	276	300	114	7	20	52	264	123
26	246	141	89	422	305	300	105	7	20	52	252	123
27	210	132	89	523	305	300	89	7	24	52	216	123
28	186	123	97	640	320	260	89	7	24	63	172	123
29	136	.....	105	640	336	248	97	7	24	70	161	141
30	118	.....	105	665	369	236	97	7	24	70	161	161
31	118	.....	97	.....	443	.....	89	7	.....	76	.....	305
1910.												
1	277	240	182	216	277	252	70	10	10	10	10	20
2	252	264	151	227	264	252	63	10	10	10	14	20
3	252	264	132	252	252	227	52	10	10	10	14	34
4	264	252	132	240	240	240	52	10	10	10	14	42
5	252	252	161	240	193	227	52	10	10	10	14	34
6	277	252	172	240	182	227	52	10	10	10	14	27
7	277	252	172	291	182	216	52	10	10	10	14	27
8	252	252	161	321	204	204	52	10	10	10	14	20
9	252	227	161	321	240	204	42	10	10	10	17	27
10	252	227	161	321	252	204	42	10	10	10	20	34
11	252	227	193	321	264	204	42	10	10	10	20	52
12	240	240	204	321	252	193	34	10	10	10	27	34
13	240	240	240	291	240	193	34	10	10	10	20	34
14	227	240	252	291	216	182	27	10	10	14	14	20
15	227	227	240	291	216	182	27	10	10	14	14	27
16	204	252	240	252	227	182	27	10	20	14	14	27
17	204	252	291	264	227	172	27	10	20	14	14	27
18	204	252	305	321	227	161	27	10	10	14	20	42
19	204	252	440	321	204	151	27	10	10	14	20	34
20	204	252	386	354	204	141	27	10	10	14	20	34
21	227	252	305	354	204	141	27	10	10	14	20	34
22	227	252	252	321	204	141	27	10	10	14	20	27
23	227	252	252	321	227	141	27	10	10	10	27	27
24	240	252	240	321	216	141	14	10	10	10	34	20
25	252	252	172	321	216	141	14	10	10	10	27	20
26	252	252	172	321	227	141	14	10	10	10	27	20
27	204	227	172	321	227	123	10	10	10	10	27	20
28	216	204	161	354	227	105	10	10	10	10	27	20
29	204	.....	161	321	227	89	7	10	10	10	27	27
30	227	.....	161	305	227	76	7	10	10	10	20	27
31	216	.....	161	.....	227	.....	7	10	.....	10	.....	27

NOTE.—Daily discharge table for 1909 supersedes that published in Water-Supply Paper 270, p. 130, which was based on an unreliable curve. Discharge revised from a set of parallel curves drawn through scattered discharge measurements, using 1910 curve as standard.

Daily discharge for 1910 determined from a discharge rating curve well defined for all stages. Discharge estimated for days on which gage was not read.

No correction made for ice effect during December, 1910.

Monthly discharge of Prosser Creek near Hobart Mills, Cal., for 1909 and 1910.

[Drainage area, 48 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1909.							
January	1,290	60	277	5.77	6.65	17,000	C.
February	172	34	92.0	1.92	2.00	5,110	B.
March	132	89	110	2.29	2.64	6,760	B.
April	665	114	375	7.81	8.71	22,300	C.
May	692	276	469	9.58	11.04	28,300	C.
June	568	236	374	7.79	8.69	22,300	C.
July	224	89	142	2.96	3.41	8,730	B.
August	76	7	23.4	.488	.56	1,440	A.
September	24	7	16.1	.335	.37	958	A.
October	76	20	45.6	.950	1.10	2,800	A.
November	900	52	151	3.15	3.51	8,980	B.
December	480	123	187	3.90	4.50	11,500	B.
The year	1,290	7	188	3.92	53.18	136,000	
1910.							
January	277	204	236	4.92	5.67	14,500	C.
February	264	204	245	5.10	5.31	13,600	B.
March	440	132	212	4.42	5.10	13,000	B.
April	354	216	299	6.23	6.95	17,800	B.
May	277	182	226	4.71	5.43	13,900	B.
June	252	76	175	3.65	4.07	10,400	A.
July	42	7	32.0	.667	.69	1,970	C.
August	10	10	10.0	.208	.24	615	C.
September	20	10	10.7	.223	.25	637	C.
October	14	10	11.2	.233	.27	689	C.
November	34	10	19.5	.406	.45	1,160	B.
December	52	20	27.7	.577	.66	1,700	B.
The year	440	7	124	2.58	35.09	90,000	

LITTLE TRUCKEE RIVER AT STARR, CAL.

Little Truckee River rises on the eastern slope of the Sierra Nevada, in northwestern Nevada County, Cal., flows north, then east, and then south, and unites with the Truckee at the town of Boca, Cal.

The gaging station, which is located at Starr, Cal., about 5 miles north of Boca, the nearest post office, was established June 25, 1903, at Bruhn's mill, or Pine station, on the Boca & Loyalton Railroad, was removed to its present site on January 1, 1908, and was discontinued October 22, 1910. The flow is practically the same at both places.

The station is below all tributaries except Dry Creek, and furnished data necessary to determine the quantity of water available for storage at Independence and Webber lakes and along the course of the stream and also for power development.

A new inclined gage was established August 3, 1909, with a datum 1 foot lower than that of the original gage. The creek freezes during parts of the winter.

Discharge measurements are made from a cable and car.

Daily discharge for April 18, 19, and 29, May 5 and 6, and June 3, 4, and 5, 1909, as published in Water-Supply Paper 270, should be reduced 100 second-feet, as an error was found in values published for these dates.

This station was maintained by the United States Reclamation Service.

Discharge measurements of Little Truckee River at Starr, Cal., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 24	F. C. Schafer	86	124	2.60	519
Aug. 27	do	32	14.6	.70	13
Sept. 22[a]	T. W. Norcross	40	23	.77	20
Dec. 15	D. S. Stuver	40	38.4	1.33	81.8

[a] Wading measurement.

Daily gage height, in feet, of Little Truckee River at Starr, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	2.25	2.45	1.9	2.85	2.85	2.5	1.3	0.7	0.65	0.8
2	2.2	2.35	1.85	2.95	2.75	2.55	1.2	.75	.65	.8
3	2.1	2.5	1.95	2.9	2.75	2.45	1.2	.7	.7	.8
4	2.1	2.65	2.0	2.8	2.6	2.4	1.2	.75	.7	.8
5	2.05	2.95	2.1	2.75	2.45	2.2	1.15	.7	.7	.8
6	2.3	3.1	2.1	2.95	2.45	2.05	1.05	.7	.7	.8
7	2.2	3.2	2.2	2.95	2.55	2.0	1.05	.7	.65	.8
8	2.1	2.95	2.3	3.05	2.75	1.95	1.0	.7	.7	.8
9	1.95	3.1	2.3	3.1	2.9	1.85	1.0	.7	.7	.8
10	1.95	2.75	2.4	3.15	3.0	1.85	1.0	.7	.7	.8
11	1.95	2.65	2.5	3.05	3.0	1.9	1.0	.75	.65	.85
12	1.95	2.7	2.55	2.95	3.0	1.8	.95	.75	.7	.9
13	2.05	2.55	2.6	3.0	2.95	1.65	.95	.7	.7	.9
14	2.05	2.5	2.7	2.9	2.9	1.7	.95	.7	.75	.8
15	2.0	2.1	2.6	2.95	2.75	1.7	.95	.7	.8	.85
16	2.1	2.4	2.55	2.95	2.75	1.7	.9	.7	1.05	.85
17	2.25	2.75	2.65	3.0	2.7	1.65	.9	.7	.9	.85
18	2.3	2.65	2.9	3.1	2.7	1.65	1.0	.7	.8	.85
19	2.4	2.45	3.75	3.25	2.7	1.6	1.0	.7	.8	.8
20	2.3	2.7	3.6	3.35	2.55	1.55	1.0	.7	.8	.8
21	2.4	2.85	3.05	3.2	2.55	1.55	.85	.7	.8	.8
22	2.4	2.8	2.85	3.2	2.65	1.5	.85	.7	.8	.8
23	2.4	2.55	2.7	3.2	2.65	1.55	.85	.65	.8	.....
24	2.5	2.5	2.5	3.25	2.7	1.45	.85	.65	.8	.....
25	2.4	2.5	2.35	3.3	2.65	1.4	.8	.65	.8	.....
26	2.8	2.0	2.55	3.35	2.55	1.45	.85	.65	.8	.....
27	2.7	2.5	2.4	3.35	2.5	1.4	.8	.65	.8	.....
28	2.7	2.2	2.35	3.45	2.6	1.25	.8	.65	.8	.....
29	2.65	.....	2.35	3.1	2.35	1.30	.75	.65	.8	.....
30	2.7	.....	2.6	3.05	2.35	1.30	.8	.7	.8	.....
31	2.65	.....	2.7	.....	2.5	.....	.75	.7	.....	.....

Daily discharge, in second-feet, of Little Truckee River at Starr, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	342	433	211	641	641	457	72	13	11	19
2	321	386	196	698	586	482	58	16	11	19
3	281	457	228	669	586	433	58	13	13	19
4	281	533	244	613	507	409	58	16	13	19
5	262	698	281	586	433	321	52	13	13	19
6	364	790	281	698	433	262	41	13	13	19
7	321	855	321	698	482	244	41	13	11	19
8	281	698	364	759	586	228	36	13	13	19
9	228	790	364	790	669	196	36	13	13	19
10	228	586	409	822	728	196	36	13	13	19
11	228	533	457	759	728	211	36	16	11	23
12	228	559	482	698	728	180	32	16	13	27
13	262	482	507	728	698	140	32	13	13	27
14	262	457	559	669	669	152	32	13	16	19
15	244	281	507	698	586	152	32	13	19	23
16	281	409	482	698	586	152	27	13	41	23
17	342	586	533	728	559	140	27	13	27	23
18	364	533	669	790	559	140	36	13	19	23
19	409	433	1,240	888	559	128	36	13	19	19
20	364	559	1,130	956	482	118	36	13	19	19
21	409	641	759	855	482	118	23	13	19	19
22	409	613	641	855	533	107	23	13	19	19
23	409	482	559	855	533	118	23	11	19	.....
24	457	457	457	888	559	98	23	11	19	.....
25	409	457	386	922	533	88	19	11	19	.....
26	613	244	482	956	482	98	23	11	19	.....
27	559	457	409	956	457	88	19	11	19	.....
28	559	321	386	1,030	507	65	19	11	19	.....
29	533	.....	386	790	386	72	16	11	19	.....
30	559	.....	507	759	386	72	19	13	19	.....
31	533	.....	559	.....	457	.....	16	13	.....	.....

Monthly discharge of Little Truckee River at Starr, Cal., for 1910.

[Drainage area, 166 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	613	228	366	2.20	2.54	22,500	D.
February	855	244	526	3.17	3.30	29,200	D.
March	1,240	196	484	2.92	3.37	29,800	B.
April	1,030	586	782	4.71	5.26	46,500	B.
May	728	386	552	3.33	3.84	33,900	B.
June	482	65	189	1.14	1.27	11,200	B.
July	72	16	33.5	.202	.23	2,060	A.
August	16	11	12.9	.078	.09	793	B.
September	41	11	17.0	.102	.11	1,010	B.
Oct. 1–22	.....	.....	19.7	.119	.10	898	B.
The period	.....	.....	.....	.....	.....	178,000	

WARNER LAKE BASIN.

GENERAL FEATURES.

The Warner Lake basin includes a chain of lakes and marshes extending in a general north and south direction between two high escarpments in the southeastern portion of Lake County. The waters of these lakes flow from south to north. The total drop between the

water surface of Crump and Bluejoint lakes, as determined in 1911, was about 11 feet. There is almost no point where a well-defined channel or an appreciable velocity of current can be found, the greatest concentrated drop being at the lower end of Hart Lake. The lakes in the southern end of the valley are therefore fresh, while those at the northern end are alkaline. The larger lakes in the area from south to north are Crump Lake, Hart Lake, Flagstaff Lake, and Bluejoint Lake. The general elevation of the water surface is about 4,550 feet.

The total area topographically tributary to Warner Lake comprises 2,100 square miles, of which 360 lie in the valley. Practically the entire run-off is contributed by an area of about 600 square miles in the south and west edges of the basin.

The principal perennial streams in this basin are Twentymile Creek, flowing from the south, Deep Creek (formerly called Warner Creek), and Honey Creek, flowing from the west. These streams rise on the eastern slope of the Warner Mountains, a range which extends southward into California.

Deep Creek is the most important, and its run-off is the best maintained during the summer. Honey Creek and Twentymile Creek each appear to furnish about half as much water as Deep Creek. In addition to these, a number of intermittent streams enter from both sides of the valley, of which Rabbit Creek, which drains an area north of Honey Creek, is perhaps the most important. Protected by the high ridges that border it on both sides, this valley has reached a fairly high stage of agricultural development. At the base of the hills bordering the western shores of Hart and Crump lakes are a number of prosperous ranches whose products include fruit, grains, and nearly all agricultural crops. The water of all three streams is largely used for irrigation, both in their upper reaches and in the valley. Any additional irrigation development will require construction of storage reservoirs on their headwaters.

Around the west side and north end of the valley is a large area of agricultural land which is now growing sagebrush. The Warner Lake Irrigation Co. has a preliminary contract for the reclamation of these lands under the provision of the Carey Act. Its plans contemplate the pumping of water from Hart Lake or Flagstaff Lake by hydroelectric power developed on the lower portion of Deep Creek, where the stream passes over an escarpment and has a large concentrated fall. The low-water flow of the stream will be augmented by storage in Big Valley, a large marsh lying near its headwaters at an elevation of over 1,000 feet above Warner Valley.

A number of springs, some of them thermal, issue along the edge of the escarpment on both sides of the valley. On the west side these are found in a belt extending about 10 miles north and 3 miles south

of Adel. On the east side they are limited to 3 or 4 miles near the line between Tps. 37 and 38 S. The water of these springs is used for irrigation, and some of them probably discharge nearly a second-foot.

TWENTYMILE CREEK NEAR WARNER LAKE, OREG.

Twentymile Creek rises in Oregon near the California boundary line and flows eastward and northward into the marsh at the head of Warner Valley. About midway its course it receives Twelvemile Creek, which drains an area in California and Nevada considerably larger than that directly tributary to the main stream. Cowhead Lake, which lies just north of the low divide between the headwaters of Twelvemile Creek and the streams which drain southward to Surprise Valley, receives the water of Eightmile Creek and drains northward into Twelvemile Creek. This lake can probably be used as a storage reservoir by diverting the water of the other streams into it.

The gaging station, which is located about 2 miles above Warner Lake post office, in sec. 25, T. 40 S., R. 23 E., and below all tributaries, was established March 1, 1910.

Except for a small amount of water diverted in two ditches just above, the total run-off from the drainage area is shown by the records.

The first gage (lower gage) was installed at the bridge, where the readings were affected by the operation of a dam below after April 19. The second or present staff gage, established June 3, 1910, at a new datum (upper gage), is located about one-fourth mile above the bridge and above a fall in the stream. The datum of the second gage has probably changed since it was installed.

Discharge measurements are made from the highway bridge and by wading.

Records derived from observations at the lower gage are rendered somewhat uncertain by the effect of the dam and by the diurnal fluctuation normal to the early spring. Records obtained at the upper gage are more reliable, except between measurements made July 8 and September 30, when a change in datum of about 0.3 foot is assumed to have occurred. The most probable date of occurrence of this change is believed to be September 16.

Discharge measurements of Twentymile Creek near Warner Lake, Oreg., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
	LOWER GAGE.				
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 1	Warner Lake Irrigation Co	127	455	4.80	2,610
7	do	61	229	1.80	396
10	do	57	212	1.60	328
24	do	53	139	1.30	157
24	do	54	146	1.40	179
May 19	Stevens and Allen	59	150	[a] 1.73	55
	UPPER GAGE.				
May 19	Stevens and Allen	59	150	1.62	55
June 13	Warner Lake Irrigation Co	50	105	1.30	33
14[b]	do	23	32	.85	19
23[b]	do	22	10.8	.48	11.6
July 8[b]	do	6.3	4.4	.11	5.7
Sept. 30[b]	Allen and Davenport	20	96	.12	3.9

[a] Gage height affected by backwater from dam. [b] Measured by wading.

Daily gage height, in feet, of Twentymile Creek near Warner Lake, Oreg., for 1910.

[Warner Lake Irrigation Co., observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	4.8	1.2	.....	.....	+0.2	0.0	−0.1	0.1	0.2	0.5
2	.....	.....	4.2	.....	.....	.....	+ .2	.0	− .1	.1	.2	.4
3	.....	.....	3.0	.....	.....	1.3	.05	.0	− .1	.2	.2	.7
4	.....	.....	2.3	1.1	.....	1.2	.05	.0	− .1	.2	.2	1.0
5	.....	.....	2.2	1.0	.....	1.2	.05	.0	− .1	.2	.2	.7
6	.....	.....	1.9	1.1	.....	1.15	.2	.0	− .1	.2	.2	.5
7	.....	.....	1.8	1.1	.....	1.1	.1	.0	− .1	.2	.2	.5
8	.....	.....	1.7	1.2	.....	1.05	.1	.0	.0	.2	.2	.7
9	.....	.....	1.7	1.1	.....	.95	.1	− .1	.0	.2	.4	2.3
10	.....	.....	1.7	1.1	.....	.9	.05	− .15	− .05	.2	.4	4.1
11	.....	.....	1.8	1.1	.....	.9	− .1	− .15	− .05	.2	.4	2.4
12	.....	.....	1.7	1.1	.....	.9	− .1	− .15	− .05	.2	.5	1.7
13	.....	.....	1.7	1.1	.....	.85	− .15	− .1	− .05	.2	.3	1.0
14	.....	.....	1.6	1.0	.....	.8	− .05	− .1	− .05	.2	.3	.8
15	.....	.....	1.6	1.0	.....	.8	.0	− .15	− .05	.2	.3	.7
16	.....	.....	1.7	1.0	.....	.8	.1	− .1	.2	.2	.3	.6
17	.....	.....	1.8	1.0	.....	.8	.05	− .1	.05	.2	.3	.6
18	.....	.....	1.7	1.1	.....	.7	− .05	− .1	.05	.2	.3	.6
19	.....	.....	1.9	1.1	.....	.65	− .05	− .1	.1	.2	.3	.6
20	.....	.....	1.8	.....	.....	.6	.2	− .2	.1	.2	.3	.6
21	.....	.....	1.7	.....	.....	.5	.1	− .2	.2	.2	.3	.6
22	.....	.....	1.7	.....	.....	.5	.05	− .1	.2	.2	.5	.6
23	.....	.....	1.5	.....	.....	.5	.0	− .1	.1	.2	.6	.6
24	.....	.....	1.3	.....	.....	.4	.0	− .2	.1	.2	.7	.6
25	.....	.....	1.4	.....	.....	.4	.0	− .2	.1	.2	.8	.6
26	.....	.....	1.4	.....	.....	.35	.0	− .2	.1	.2	.5	.5
27	.....	.....	1.4	.....	.....	.35	.0	− .2	.1	.2	.5	.5
28	.....	.....	1.2	.....	.....	.3	.1	− .2	.1	.2	.4	.5
29	.....	.....	1.1	.....	.....	.25	.1	− .1	.1	.2	.4	.5
30	.....	.....	1.2	.....	.....	.25	.05	− .1	.1	.2	.5	.5
31	.....	.....	1.1	.....	.....	.....	.0	− .1	.....	.2	.....	.5

NOTE.—Readings for March and April made at the bridge (lower) gage; those beginning in June at the upper gage. Readings on bridge gage after Apr. 19 discarded, as they indicate backwater from the diversion dam below. Probably no ice at this station during period covered by records. Readings for Mar. 1 and 2 may have been made in the afternoon and are probably higher than the true daily mean.

Daily discharge, in second feet, of Twentymile Creek near Warner Lake, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			2,610	134	112	36	7	5	4	3	4	9
2			2,020	134	99	35	7	5	4	3	4	7
3			1,020	134	99	34	5.5	5	4	4	4	13
4			600	115	99	30	5.5	5	4	4	4	19
5			550	98	87	30	5.5	5	4	4	4	13
6			432	115	73	28	7	5	4	4	4	9
7			396	115	62	26	6	5	4	4	4	9
8			362	134	62	24	6	5	5	4	4	13
9			362	115	62	22	6	4	5	4	7	120
10			362	115	91	20	5.5	3.5	4.5	4	7	486
11			380	115	91	20	4	3.5	4.5	4	7	134
12			350	115	80	20	4	3.5	4.5	4	9	54
13			350	115	80	19	3.5	4	4.5	4	5	19
14			300	98	80	18	4.5	4	4.5	4	5	15
15			300	98	70	18	5	3.5	4.5	4	5	13
16			330	98	70	18	6	4	4	4	5	11
17			350	98	62	18	5.5	4	2.5	4	5	11
18			320	115	55	16	4.5	4	2.5	4	5	11
19			390	115	55	15	4.5	4	3	4	5	11
20			340	148	55	14	7	3	3	4	5	11
21			310	126	55	12	6	3	4	4	5	11
22			310	118	50	12	5.5	4	4	4	9	11
23			260	118	48	12	5	4	3	4	11	11
24			156	118	48	10	5	3	3	4	13	11
25			180	129	48	10	5	3	3	4	15	11
26			180	139	48	9	5	3	3	4	9	9
27			180	132	48	9	5	3	3	4	9	9
28			134	123	46	8	6	3	3	4	7	9
29			115	109	42	7.5	6	4	3	4	7	9
30			134	118	38	7.5	5.5	4	3	4	9	9
31			115	.....	37	.....	5	4	.....	4	.....	9

NOTE.—Daily discharge determined as follows: Mar. 1 to 10, from a fairly well defined discharge rating curve; Mar. 11 to 23, by indirect method for shifting channels; Mar. 24 to Apr. 19, from a poorly defined curve; Apr. 20 to June 2, by means of a hydrograph drawn through the measurement of May 19 and following the rise and fall of Deep Creek near Adel; June 3 to Sept. 15, from a curve well defined above 5 second-feet; Sept. 16 to Dec. 31, from a rating curve well defined (by measurement of Sept. 30, 1910, and measurements in 1911) between 3 and 600 second-feet.

Determinations for the early part of March, especially the first two days, are liable to considerable error, resulting from reading the gage but once daily during a time when there was considerable diurnal fluctuations normal to the early spring.

Monthly discharge of Twentymile Creek near Warner Lake, Oreg., for 1910.

[Drainage area, 126 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Mean per square Mile.	Depth in inches.	Total in acre-feet.	
March	2,610	115	458	3.63	4.18	28,200	C.
April	148	98	118	.936	1.04	7,020	C.
May	112	37	66.2	.525	.61	4,070	C.
June	36	7.5	18.6	.148	.17	1,110	B.
July	7	3.5	5.44	.043	.05	334	B.
August	5	3	3.97	.032	.04	244	C.
September	4.5	2.5	3.73	.030	.03	222	C.
October	4	3	3.94	.031	.04	242	B.
November	15	4	6.53	.052	.06	389	B.
December	486	7	35.5	.282	.33	2,180	B.
The period	.....	.....	.....	.....	.....	44,000	

DEEP CREEK[1] AT ADEL, OREG.

Deep Creek rises on the east slope of the high escarpment that lies just east of the Goose Lake Valley, and flows eastward into the marshes that form the upper portion of Warner Valley. The mountains at its headwaters reach an elevation of over 7,000 feet.

Its principal tributaries are Camas Creek, which enters from the north just above the escarpment, and Drake Creek, a small stream just below Camas. Mud, Blue, and Sagehen Creeks are tributaries of Camas Creek. There are reservoir sites on Deep Creek at Big Valley, on Camas Creek with dam site below Mud Creek, and at Crane Lake on Crane Creek, a tributary of Sagehen Creek.

The gaging station, which is located at Adel, in the SE. ¼ NW. ¼ sec. 21, T. 39 S., R. 24 E., below all tributaries, was established May 11, 1909.

Several small ditches divert water for irrigation near the headwaters of the stream. Two or three thousand acres are watered by natural flooding in Big Valley and Crane Lake, but much of the water thus diverted probably returns to the stream. Five ditches take out within 6 or 8 miles above the station and divert water around it to irrigate several hundred acres of land. The combined capacity of these ditches is about 30 second-feet. Measurements of their combined discharge were made in June, 1910, and April and July, 1911, and gave 25, 20, and 18 second-feet respectively.

The staff gage (upper gage) is located about 500 feet above the bridge and above a series of rapids; its datum has remained unchanged. A second gage (lower gage) was established by the Warner Lake Irrigation Co., February 28, 1910, at the bridge and read about 7 weeks.

Discharge measurements are made from the county bridge 300 yards north of Adel post office and by wading. Below the bridge the grade of the stream is very flat, and the water is diverted into the M–C. ditch by means of a temporary dam, which is repaired at the beginning of each irrigation season. The upper gage is out of the influence of this dam, but the relation of gage height to discharge at the lower gage location is liable to be disturbed by changes in and operation of this dam.

The relation between gage heights and discharge is affected by ice during periods of extreme cold weather, and occasionally by ice jams.

Conditions at this station are fairly good, although a diurnal fluctuation during the spring renders the determination of the mean gage height rather difficult.

The station is maintained in cooperation with the Warner Lake Irrigation Co., which has furnished part of the gage heights and discharge measurements.

[1] Formerly called Warner Creek.

Discharge measurements of Deep Creek at Adel, Oreg., for 1909–10.

UPPER GAGE.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1909.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 12	R. B. Post	49	183	4.30	510
Dec. 5	do	30	80	3.52	129
1910.					
Mar. 1	Warner Lake Irrigation Co	119	473	7.80	3,340
May 19	Stevens and Allen	57	179	3.85	206
June 3	Warner Lake Irrigation Co	40	156	3.50	127
June 14[a]	do	27	29	3.10	59
July 8[a]	do	23	18.7	2.81	11.3
Sept. 29[a]	Allen and Davenport	23	19.4	2.87	14.9

[a] Measured by wading.

Daily gage height, in feet, of Deep Creek at Adel, Oreg., for 1910.

UPPER GAGE.

[J. J. Van Keulen, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.2	.....	6.8	4.4	4.4	3.5	2.85	2.7	2.8	2.85	2.9	3.25
2	3.6	.....	7.3	4.4	4.3	3.5	2.8	2.7	2.8	2.85	2.9	3.3
3	3.6	.....	5.65	4.1	4.3	3.5	2.8	2.7	2.8	2.85	2.9	3.55
4	3.9	.....	5.3	4.1	4.3	3.4	2.8	2.7	2.8	2.85	2.9	3.55
5	3.8	.....	5.4	4.1	4.2	3.35	2.8	2.7	2.8	2.85	2.9	3.5
6	3.6	.....	4.9	4.3	4.1	3.3	2.8	2.7	2.8	2.9	2.9	3.3
7	3.6	.....	4.9	4.4	4.0	3.3	2.8	2.7	2.8	2.9	2.9	3.4
8	3.4	3.1	4.7	4.5	4.0	3.3	2.8	2.7	2.8	2.9	3.0	3.55
9	3.3	3.1	4.6	4.5	4.0	3.2	2.8	2.7	2.8	2.9	3.2	3.5
10	3.2	3.1	4.5	4.5	4.2	3.1	2.8	2.7	2.8	2.9	3.2	4.3
11	3.2	3.0	4.5	4.5	4.2	3.1	2.8	2.7	2.8	2.9	3.0	4.55
12	3.2	3.0	4.7	4.5	4.1	3.1	2.8	2.7	2.8	2.9	3.2	4.8
13	3.3	3.0	4.8	4.5	4.1	3.1	2.8	2.8	2.8	2.9	3.3	4.8
14	3.3	3.0	4.9	4.4	4.1	3.1	2.8	2.8	2.8	2.9	3.05	4.35
15	3.3	3.0	4.9	4.4	4.0	3.1	2.7	2.8	2.8	2.9	2.95	4.0
16	3.3	3.0	5.0	4.4	4.0	3.1	2.7	2.8	2.9	2.9	3.0	3.35
17	3.2	3.0	5.0	4.5	3.9	3.1	2.7	2.8	2.9	2.9	3.1	3.1
18	3.2	2.9	5.1	4.5	3.9	3.1	2.7	2.7	2.9	2.9	3.0	3.05
19	3.2	2.9	5.0	4.5	3.8	3.1	2.7	2.7	2.9	2.9	3.0	3.4
20	3.1	2.9	5.0	4.7	3.8	3.05	2.7	2.75	2.9	2.9	3.0	3.35
21	3.1	2.9	5.0	4.55	3.8	3.0	2.9	2.75	2.9	2.9	3.1	3.3
22	3.5	2.9	5.0	4.5	3.8	3.0	2.9	2.75	2.9	2.9	3.1	3.3
23	8.8	3.0	4.9	4.5	3.7	3.0	2.8	2.75	2.9	2.9	3.25	3.25
24	.....	3.0	4.5	4.5	3.7	3.0	2.8	2.75	2.9	2.9	3.4	3.45
25	.....	3.2	4.5	4.55	3.7	3.0	2.7	2.75	2.9	2.9	3.35	3.35
26	.....	3.1	4.4	4.6	3.7	3.0	2.7	2.75	2.9	2.9	3.2	3.2
27	.....	3.1	4.4	4.55	3.7	3.0	2.7	2.75	2.9	2.9	3.05	3.15
28	.....	4.4	4.3	4.5	3.65	2.9	2.7	2.75	2.9	2.9	3.1	3.25
29	.....	.....	4.2	4.4	3.6	2.85	2.7	2.75	2.9	2.9	3.0	3.3
30	.....	.....	4.2	4.45	3.5	2.85	2.7	2.75	2.85	2.9	3.25	3.25
31	.....	.....	4.2	.....	3.5	.....	2.7	2.75	.....	2.9	.....	3.2

NOTE.—Gage heights probably raised by ice Jan. 2–9. Gage carried out by flood and ice jam Jan. 23 and replaced by observer Feb. 8. Creek somewhat obstructed by ice Feb. 8 to 14, after which obstruction not probable. Gage heights Feb. 28 to Mar. 2 are the mean of several readings a day. The highest stage reached was 9.0 feet at 6 p. m. Mar. 2. Subsequent readings were made about noon each day when the creek was at about its lowest stage in the diurnal cycle, and are therefore not fairly representative of the daily mean.

Discharge measurements of Deep Creek at Adel, Oreg., for 1910.

LOWER GAGE.

Date.	Time.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
			Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 1	8 a. m.	Warner Lake Irrigation Co	60	248	3.45	1,630
1	6.30 p. m.	do	119	473	6.50	3,340
3	5 p. m.	do	97	377	5.10	2,290
4	8 a. m.	do	60	187	2.80	1,080
4	5 p. m.	do	58	265	4.00	1,550
5	8 a. m.	do	60	184	2.80	1,070
7	do	do	53	136	1.70	667
7	5 p. m.	do	57	156	2.00	836
8	7.40 a. m.	do	55	139	1.60	676
10	8 a. m.	do	55	104	.50	468

Daily gage height, in feet, of Deep Creek at Adel, Oreg., for 1910.

LOWER GAGE.

[Warner Lake Irrigation Co., observer.]

Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.
1		5.0	1.2	11		1.6	1.4	21		2.5	
2		5.2	1.2	12		1.7	1.4	22		1.9	
3		5.1	.8	13		1.7	1.4	23		1.7	
4		2.8	.9	14		1.9	1.3	24		1.6	
5		4.0	1.0	15		2.0	1.2	25		1.4	
6		2.4	1.0	16		1.8	1.1	26		1.3	
7		2.0	1.1	17		2.0	1.1	27		1.3	
8		2.2	1.4	18		2.2	1.3	28	1.1	1.2	
9		1.6	1.4	19		2.8	1.5	29		1.1	
10		.5	1.4	20		2.7	1.4	30		1.0	
								31		1.0	

NOTE.—Gage heights observed on bridge gage probably affected by backwater from the diversion dam below after about Apr. 1; time of observation not known, but it probably varied from day to day.

Daily discharge, in second-feet, of Deep Creek at Adel, Oreg., for 1909–10.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1						600	130	13	5	23	35	370
2						700	130	13	5	23	86	122
3						750	130	8	5	23	50	122
4						750	86	8	5	23	35	122
5						750	86	8	18	23	35	99
6						650	130	8	13	23	50	99
7						550	130	8	5	23	42	99
8						510	107	8	8	13	35	122
9						470	86	8	8	13	50	199
10						430	86	8	8	13	35	145
11					550	430	86	8	8	13	35	122
12					510	430	66	8	13	13	23	122
13					510	430	66	5	13	13	13	171
14					510	430	66	5	13	13	13	99
15					510	390	50	5	13	13	13	80
16					470	390	50	5	13	13	35	80
17					470	350	35	5	13	13	50	80
18					470	310	35	5	13	13	35	61
19					510	350	23	5	13	13	66	61
20					510	390	23	5	13	18	750	61
21					550	310	23	5	13	18	1,700	61
22					510	270	23	5	13	18	1,100	80
23					510	240	13	5	13	13	1,800	80
24					390	240	13	5	13	13	1,610	80
25					390	210	13	5	13	13	1,020	99

Daily discharge, in second-feet, of Deep Creek at Adel, Oreg., for 1909-10.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
26	.....	.....	.....	.....	470	210	13	5	13	13	490	99
27	.....	.....	.....	.....	650	182	13	5	13	13	410	99
28	.....	.....	.....	.....	700	182	13	5	23	13	350	99
29	.....	.....	.....	.....	600	156	13	5	23	13	330	80
30	.....	.....	.....	.....	470	130	13	5	23	13	370	80
31	.....	.....	.....	.....	510	.....	13	5	.....	18	.....	61
1910.												
1	61	60	2,020	410	410	122	14	7	11	14	18	70
2	61	50	2,400	410	370	122	11	7	11	14	18	80
3	61	40	1,580	295	370	122	11	7	11	14	18	134
4	61	30	1,280	295	370	99	11	7	11	14	18	134
5	61	30	1,080	295	330	90	11	7	11	14	18	122
6	61	25	771	370	295	80	11	7	11	18	18	80
7	61	25	766	410	260	80	11	7	11	18	18	99
8	61	20	671	450	260	80	11	7	11	18	30	134
9	61	20	588	450	260	61	11	7	11	18	61	122
10	61	20	484	450	330	44	11	7	11	18	61	370
11	61	25	565	450	330	44	11	7	11	18	30	470
12	61	25	622	450	295	44	11	7	11	18	61	590
13	80	25	648	450	295	44	11	11	11	18	80	590
14	80	30	702	410	295	44	11	11	11	18	37	390
15	80	30	718	410	260	44	7	11	11	18	24	260
16	80	30	712	410	260	44	7	11	13	18	30	90
17	61	30	742	450	229	44	7	11	18	18	44	44
18	61	18	802	450	229	44	7	7	18	18	30	37
19	61	18	875	450	199	44	7	7	18	18	30	99
20	44	18	855	540	199	37	7	9	18	18	30	90
21	44	18	822	470	199	30	18	9	18	18	44	80
22	122	18	728	450	199	30	18	9	18	18	44	80
23	2,500	30	672	450	171	30	11	9	18	18	70	70
24	1,000	30	565	450	171	30	11	9	18	18	99	110
25	800	61	540	470	171	30	7	9	18	18	90	90
26	600	44	508	490	171	30	7	9	18	18	61	61
27	400	44	508	470	171	30	7	9	18	18	37	52
28	300	410	478	450	158	18	7	9	18	18	44	70
29	200	.....	448	410	145	14	7	9	18	18	30	80
30	100	.....	438	430	122	14	7	9	14	18	70	70
31	80	.....	438	.....	122	.....	7	9	.....	18	.....	61

NOTE.—Daily discharge, except as noted, based on readings of the upper gage as published. Discharge May 11 to Nov. 20, 1909, determined from a discharge rating curve fairly well defined above 50 second-feet; curve is based on one measurement in May and the form of the curve for the period following, but it gives results consistent with the daily discharge for low water of 1910. Discharge from Nov. 21, 1909, to Dec. 31, 1910, determined from a rating curve well defined between 10 and 1,500 second-feet.

Special methods used as follows: Jan. 2 to 9, discharge interpolated because of ice; Jan. 23, estimated, because of ice jam, at about one-half of open channel discharge; Jan. 24 to Feb. 7 estimated, assuming that creek fell rather rapidly after the high water; Feb. 8 to 13, estimate reduced on account of ice; Mar. 1 to 10, discharge taken from a hydrograph drawn by plotting as coordinates with time the discharge corresponding to gage readings on the upper gage and the measurements made by engineers of the Warner Lake Irrigation Co., probably represents the daily mean fairly well; Mar. 11 to 31, mean discharge determined from the two sets of gage readings on upper and bridge gage.

The maximum discharge recorded, 4,950 second-feet, at 6 p. m. Mar. 2, 1910.

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Monthly discharge of Deep Creek at Adel, Oreg., for 1909 and 1910.

[Drainage area, 272 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Mean per square mile.	Depth in inches.	Total in acre-feet.	
1909.							
May 11–31	700	390	513	1.89	1.48	21,400	B.
June	750	130	406	1.49	1.66	24,200	B.
July	130	13	56.9	.209	.24	3,500	B.
August	13	5	6.48	.024	.03	398	C.
September	23	5	12.2	.045	.05	726	C.
October	23	13	15.9	.058	.07	978	B.
November	1,800	13	355	1.31	1.46	21,100	C.
December	370	61	108	.397	.46	6,640	C.
The period						78,900	
1910.							
January	2,500	44	240	0.882	1.02	14,800	D.
February	410	18	43.7	.161	.17	2,430	C.
March	2,400	438	807	2.97	3.42	49,600	C.
April	540	295	428	1.57	1.75	25,500	B.
May	410	122	247	.908	1.05	15,200	B.
June	122	14	53.0	.195	.22	3,150	B.
July	18	7	9.77	.036	.04	601	B.
August	11	7	8.42	.031	.04	518	B.
September	18	10	15.0	.055	.06	893	B.
October	18	14	17.4	.064	.07	1,070	B.
November	99	18	42.1	.155	.17	2,510	B.
December	590	37	156	.574	.66	9,590	B.
The year	2,500	7	174	.636	8.67	126,000	

HONEY CREEK NEAR PLUSH, OREG.

Honey Creek drains a high area lying between the escarpments that border the valleys of Warner Lake and Lake Abert. The main stream rises on the north slope of Crooks Peak. Snyder Creek from the north and Twelvemile Creek from the south are its principal tributaries. McDowell Creek is a tributary of Twelvemile. Storage is available on Snyder Creek, and water can be diverted into the reservoir from the upper portion of Honey Creek.

The gaging station, which is located at the mouth of the canyon 1 mile above the bridge in the SW. $\frac{1}{4}$ sec. 20, T. 36 S., R. 24 E. was established May 13, 1909, at a wagon bridge one-fourth mile north of Plush in NE. $\frac{1}{4}$ sec. 29 of the same township. It is below all tributaries.

The gage first used was a vertical staff fastened to the wagon bridge, and measurements were made from the bridge, but the gage heights were affected by a temporary dam used below the station to divert water into an irrigation ditch, and on February 24, 1910, a new gage was installed at the present site by the Warner Lake Irrigation Co. Since the new station was established the datum of the gage has remained unchanged.

At high and ordinary stages discharge measurements are made from a cable at the gage; at extreme low stages measurements are made by wading.

The records at the new site show the total run-off of the creek except for a small amount of water used for the irrigation of a few hundred acres on the headwaters of the stream and are fairly reliable, although the accuracy is vitiated by diurnal fluctuations which have been only partly covered by gage readings.

Discharge measurements of Honey Creek near Plush, Oreg., for 1910.

Date.	Time.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
			Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 24	6 a. m.	Warner Lake Irrigation Co	88	318	6.30	2,240
25	10 a. m.	do	24	38	1.50	125
25	4 p. m.	do	41	60	2.00	204
26	11.40 a. m.	do	20	22	.70	64
26	3 p. m.	do	22	31	1.30	91
26	5 p. m.	do	22	38	1.50	104
Mar. 2	1 p. m.	do	64	191	4.00	702
2	5 p. m.	do	65	176	4.30	933
5	6 p. m.	do	37	72	2.50	243
8	3.20 p. m.	do	26	41	1.50	129
9	9.30 a. m.	do	23	39	1.50	116
12	9.45 a. m.	do	25	46	1.60	128
May 19		Stevens and Allen	18	28	+ .65	39
June 11		Warner Lake Irrigation Co	15	11.6	— .10	13.0
July 18		do	6	1.15	— .46	.94
Oct. 1		Allen and Davenport	14	3.5	— .38	1.9

Daily gage height, in feet, of Honey Creek near Plush, Oreg., for 1910.

[C. E. Oliver, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			5.2	1.5	1.7	0.3	—0.4			—0.4	—0.25	2.4
2			4.5	1.5	1.7	.25	— .4			— .35	— .2	
3			3.5	1.4	1.65	.25	— .4			— .35	— .15	2.3
4			3.0	1.4	1.6	.25	— .4			— .35		2.35
5			2.2	1.5	1.5	.2	— .3			— .35	— .2	2.2
6			2.2	1.4	1.3	.2	— .3			— .35	— .2	2.2
7			2.0	1.5	1.2	.2	— .35			— .35	— .15	2.15
8			1.8	1.7	1.0	.2	— .4			— .35	— .1	2.05
9			1.5	2.0	.8	.1	— .4			— .35	— .1	2.1
10			1.5	2.2	1.4	0	— .45			— .35		2.15
11			1.6	2.2	1.3	— .1	— .5			— .35	— .05	2.05
12			1.6	2.0	1.2	— .2	— .4			— .35	— .05	1.9
13			2.8	1.8	1.1	— .2	— .45			— .35	.3	1.9
14			1.8	1.8	1.1	— .1	— .4			— .35	.35	1.85
15			1.8	1.9	1.0	— .1	— .4			— .3	.35	1.85
16			2.0	2.0	.9	— .2	— .45			— .3	.6	1.7
17			2.0	1.9	.8	— .2				— .3	.65	1.55
18	4.3		2.1	1.8	.8	— .2				— .3	.7	1.45
19	4.4		2.2	1.8	.7	— .25				— .3	.8	1.45
20	4.5		2.6	1.8	.75	— .25					.9	1.4
21	4.5		2.1	1.8	.9	— .25				— .3	1.4	1.35
22	8.15		1.9	1.7	.8	— .25				— .3	1.7	1.35
23	8.6		1.8	1.7	.65	— .2				— .3	1.8	1.2
24		3.6	1.7	1.8	.6	— .2				— .3	2.05	1.2
25		2.6	1.6	1.8	.7	— .25				— .3	2.4	1.05
26		1.4	1.4	1.8	.6	— .25				— .3	2.7	.9
27		1.6	1.3	1.9	.5	— .3					2.6	.8
28		3.9	1.2	1.9	.4	— .3				— .35	2.65	
29			.9	1.8	.3	— .3				— .35	2.6	
30			1.1	1.8	.3	— .3					2.5	
31			1.3		.3					— .35		— .2

NOTE.—Bridge gage read Jan. 1 to Apr. 16, gage in poor condition and flow affected by ice part of the time; gage heights can not be used except for period Jan. 18 to 23.

Gage at the mouth of the canyon read from Feb. 24. Gage heights Feb. 24 to Mar. 5 taken from a hydrograph plotted from both the direct readings on the upper gage and the readings on the lower gage reduced to corresponding heights on the upper by means of a curve of relation. Gage heights beginning Mar. 6 represent one reading daily; no observations July 17 to Sept. 30. Gage heights for portions of November and December somewhat questionable. Probably no ice at the upper gage during the period of records.

Daily discharge, in second-feet, of Honey Creek near Plush, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	20	30	1,540	120	150	20	2			2	4	278
2	20	30	1,060	120	150	18	2			2.5	5	268
3	20	30	600	108	142	18	2			2.5	6	258
4	20	30	470	108	134	18	2			2.5	6	268
5	20	30	234	120	120	16	3			2.5	5	238
6	20	30	238	108	97	16	3			2.5	5	238
7	20	30	200	120	86	16	2.5			2.5	6	228
8	20	30	166	150	66	16	2			2.5	7	209
9	20	30	120	200	50	12	2			2.5	7	218
10	20	30	120	238	108	9	1.5			2.5	8	228
11	30	30	134	238	97	7	1			2.5	8	209
12	30	30	134	200	86	5	2			2.5	8	183
13	30	30	372	166	76	5	1.5			2.5	20	183
14	30	30	166	166	76	7	2			2.5	22	174
15	30	30	166	183	66	7	2			3	22	174
16	30	30	200	200	58	5	1.5			3	36	150
17	30	30	200	183	50	5	1.5			3	40	127
18	30	30	218	166	50	5	1.5			3	43	114
19	30	30	238	166	43	4	1.5			3	50	114
20	50	30	322	166	46	4	1.5			3	58	108
21	100	30	218	166	58	4	1.5			3	108	102
22	1,000	30	183	150	50	4	1.5			3	150	102
23	1,200	30	166	150	40	5	1.5			3	166	86
24	800	1,030	150	166	36	5	1.5			3	209	86
25	500	407	134	166	43	4	1.5			3	278	71
26	300	120	108	166	36	4	1.5			3	346	58
27	200	150	97	183	30	3	1.5			3	322	50
28	100	884	86	183	25	3	1.5			2.5	334	39
29	50	.....	58	166	20	3	1.5			2.5	322	28
30	50	.....	76	166	20	3	1.5			2.5	300	16
31	50	.....	97	.....	20	.....	1.5	.....	.....	2.5	.....	5

NOTE.—Daily discharge Feb. 24 to Dec. 31 determined from a fairly well defined discharge rating curve.

Daily discharge Feb. 24 to Mar. 5—a period of great diurnal fluctuation—determined by applying the rating table to gage heights taken at 3-hour intervals from a hydrograph and using the mean of the 8 determinations of discharge as the discharge for the day. This method gives results considerably larger than those obtained by applying the rating table to the mean of the gage heights.

Daily discharge for high-water period in January determined by assuming a discharge of 30 second-feet for the gage reading of Jan. 19 on the lower gage, and extending a curve through this point parallel to the curve derived from the relation of the gages in February and March; values Jan. 22 and 23 reduced arbitrarily for assumed affect of ice jam; discharge was further assumed to have fallen rather rapidly.

Mean discharge for Feb. 1 to 23 estimated at 30 second-feet.

Daily discharge July 17 to Sept. 30 estimated at 1.5 second-feet.

Monthly discharge of Honey Creek near Plush, Oreg., for 1910.

[Drainage area, 232 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Mean per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1910.							
January	1,200	20	157	0.677	0.78	9,650	D.
February	1,030	30	117	.504	.52	6,500	C.
March	1,540	58	267	.115	1.33	16,400	C.
April	238	108	163	.703	.78	9,700	C.
May	150	20	68.7	.296	.34	4,220	B.
June	20	3	8.4	.036	.04	500	B.
July	3	1.5	1.8	.0078	.009	111	B.
August	.....	.....	*a* 1.5	.0064	.007	92	D.
September	.....	.....	*a* 1.5	.0064	.007	89	D.
October	3	2	2.7	.012	.01	166	B.
November	346	4	76.7	.331	.37	4,560	C.
December	278	5	149	.642	.74	9,160	D.
The year	1,540	1.5	89.5	.386	4.93	61,100	

a Estimated.

MISCELLANEOUS STATIONS IN WARNER VALLEY.

A number of gaging stations were established by the Warner Lake Irrigation Co. in June, 1910, on Deep and Honey creeks and their tributaries, and records obtained for about six weeks. The records of the measurements and gage heights have been furnished by the company, but discharges have been computed by the United States Geological Survey.

Miscellaneous discharge measurements in Warner Lake drainage basin in 1910.

[By Warner Lake Irrigation Co.]

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
June 14	Deep Creek	Crump Lake	At Big Valley, NE. ¼ sec. 4, T. 40 S., R. 22 E.	1.43	52.3
July 7	do	do	do	.93	16.6
June 16	Camas Creek	Deep Creek	Above Mud Creek, Sec. 6, T. 39 S., R. 22 E.	.96	2.5
26	do	do	do	.91	1.4
17	Mud Creek	Camas Creek	Sec. 32, T. 38 S., R. 22 E	1.09	10.0
July 8	do	do	do	.88	5.9
June 15	Blue Creek	do	do	.54	2.7
15	Drake Creek	Deep Creek	Sec. 9, T. 39 S., R. 23 E	1.13	10.0
24	do	do	do	1.12	8.8
20	Honey Creek	Hart Lake	Above Snyder Creek, sec. 13, T. 36 S., R. 22 E.	.58	3.2

Daily gage height, in feet, and discharge, in second-feet, of streams in Warner Valley, Oreg., for 1910.

	Deep Creek at Big Valley.				Camas Creek above Mud Creek.				Mud Creek near mouth.			
	June.		July.		June.		July.		June.		July.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.04	22			0.88	1.0			0.94	6.9
2			1.02	21			.87	.8			.92	6.6
3			1.00	20			.87	.8			.91	6.4
4			.98	19			.86	.7			.90	6.2
5			.96	18			.86	.7			.89	6.1
6			.95	18			.85	.6			.88	5.9
7			.93	17			.85	.6			.88	5.9
8			.91	16			.85	.6			.87	5.8
9			.90	16			.85	.6			.87	5.8
10			.90	16			.85	.6			.87	5.8
11			.89	16			.85	.6			.87	5.8
12			.89	16			.85	.6			.87	5.8
13			.88	15			.85	.6			.86	5.6
14			.87	15			.85	.6			.86	5.6
15	1.43	53	.87	15	1.00	3.6	.85	.6	1.10	10.2	.86	5.6
16	1.40	50	.86	14	.96	2.6	.85	.6	1.10	10.2	.86	5.6
17	1.38	48	.85	14	.96	2.6	.85	.6	1.09	10.0	.85	5.5
18	1.35	45	.84	14	.95	2.4	.84	.5	1.09	10.0	.85	5.5
19	1.30	40	.83	13	.94	2.2	.84	.5	1.08	9.8	.85	5.5
20	1.28	38	.82	13	.93	1.9	.84	.5	1.08	9.8	.85	5.5
21	1.26	37	.80	12	.93	1.9			1.07	9.5		
22	1.22	34	.79	12	.92	1.7			1.06	9.3		
23	1.20	32	.78	11	.92	1.7			1.06	9.3		
24	1.19	31	.78	11	.91	1.4			1.05	9.1		
25	1.17	30			.91	1.4			1.04	8.9		

Daily gage height, in feet, and discharge, in second-feet, of streams in Warner Valley, Oreg., for 1910—Continued.

	Deep Creek at Big Valley.				Camas Creek above Mud Creek.				Mud Creek near mouth.			
	June.		July.		June.		July.		June.		July.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
26	1.15	29			0.99	1.2			1.02	8.4		
27	1.12	27			.99	1.2			1.00	8.0		
28	1.10	26			.89	1.1			.99	7.8		
29	1.08	25			.89	1.1			.97	7.5		
30	1.06	24			.89	1.1			.95	7.1		
Mean		35.5		14.8		1.82		0.64		9.06		5.87
Run-off in acre-feet		1,130		705		57.6		25.4		2.87		2.33

	Blue Creek near mouth.				Drake Creek near mouth.				Honey Creek above Snyder Creek.			
	June.		July.		June.		July.		June.		July.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			0.41				1.11	8			0.64	4.7
2			.41				1.11	8			.64	4.7
3			.40				1.11	8			.63	4.5
4			.40				1.10	7			.63	4.5
5			.40				1.10	7			.62	4.2
6			.40				1.10	7			.61	4.0
7			.40				1.10	7			.60	3.8
8			.41				1.10	7			.59	3.6
9			.41				1.10	7			.58	3.4
10			.41				1.10	7			.58	3.4
11			.42				1.10	7			.57	3.2
12			.42				1.10	7			.56	3.0
13			.42				1.10	7			.55	2.8
14			.43				1.10	7			.54	2.6
15	0.44		.43		1.13	10	1.10	7	0.60	3.8	.53	2.4
16	.44		.43		1.13	10	1.10	7	.60	3.8	.52	2.2
17	.44		.44		1.13	10	1.10	7	.60	3.8	.50	1.8
18	.44		.45		1.13	10	1.10	7	.60	3.8	.50	1.8
19	.44		.45		1.13	10	1.10	7	.60	3.8	.49	1.6
20	.43		.45		1.13	10	1.10	7	.58	3.4	.48	1.4
21	.43		.45		1.13	10	1.10	7	.60	3.8	.48	1.4
22	.43		.45		1.13	10	1.10	7	.61	4.0	.48	1.4
23	.43				1.12	9	1.10	7	.62	4.2	.47	1.3
24	.42				1.12	9			.63	4.5		
25	.42				1.12	9			.64	4.7		
26	.42				1.12	9			.65	4.9		
27	.42				1.12	9			.65	4.9		
28	.42				1.12	9			.65	4.9		
29	.42				1.11	8			.65	4.9		
30	.42				1.11	8			.65	4.9		
Mean						9.5		7.1		4.26		2.94
Run-off in acre-feet						301		330		135		134

ABERT LAKE BASIN.

GENERAL FEATURES.

Abert Lake is a strongly alkaline body of water lying near the central part of Lake County at an elevation of 4,210 feet above sea level. It has a surface area of 60 square miles and a tributary basin of 926 square miles. The waters are supplied mostly by Chewaucan River and its tributaries, Coyote and Crooked creeks.

Chewaucan River rises on the high divide in the southern part of Lake County and flows northward into Chewaucan Marsh, through which it meanders in a southeasterly direction and flows into Abert Lake at its southern extremity.

The principal agricultural development in the basin consists of the hay lands in the Chewaucan Marsh and the area of irrigated lands bordering the marsh on the south and along Chewaucan River in the vicinity of Paisley.

An irrigation project is being developed under the Carey Act which will water about 12,000 acres just north of Paisley with water stored on the upper portion of Chewaucan River. The development of this project, however, has been hindered by certain water-right claims of the owners of hay lands in Chewaucan Marsh. The general practice here has been to flood the lands during the spring and winter to a depth of several feet. As all the waters are claimed for this flooding, no development work can proceed until the water rights have been settled. There is undoubtedly sufficient water for all interests if it is wisely used.

CHEWAUCAN RIVER AT PAISLEY, OREG.

This station, which is located in the SE. ¼ sec. 23, T. 33 S., R. 18 E., one-fourth mile upstream from Paisley, was established January 4, 1905. On account of insufficient funds observations were suspended from January 1, 1908, to January 17, 1909.

Near the station are several irrigation ditches. George Conn's ditch, which heads about 2½ miles above the station, diverts water around the gage. Conn's mill ditch diverts water from the left bank 250 feet below the gage, where a low timber dam has been constructed. This dam increases the gage heights artificially, but it is fairly permanent, and the accuracy of the records is not greatly affected by it. A short distance below Conn's mill ditch the Brattain ditch diverts water from the right bank. It follows the foothills for many miles down the river valley, and its water is used to irrigate land immediately around Paisley and large areas of hay land in Chewaucan marsh.

The gage is a vertical staff on the right bank.

Discharge measurements are made from a cable 60 feet below the gage.

The left bank is high; the right bank is low and will overflow at high stages for a distance of 500 feet or more.

Discharge measurements of Chewaucan River at Paisley, Oreg., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 3	L. R. Allen	43	108	5.59	423
16	do	41	86	5.06	260
Sept. 26[a]	Allen and Davenport	34	42.4	3.74	38.4
26[a]	do	34	43	3.74	38.3

[a] Measured by wading.

Daily gage height, in feet, of Chewaucan River at Paisley, Oreg., for 1910.

[Miss Lula Banister, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.9	7.6	5.5	6.1	4.4	.....	.....	.....	3.7	3.9	3.9
2	.....	4.6	6.2	5.4	5.8	4.3	.....	.....	.....	3.7	3.9	4.0
3	.....	4.4	6.9	5.2	5.6	4.3	.....	.....	.....	4.1	3.9	4.5
4	.....	4.4	6.8	5.3	5.5	4.3	.....	.....	.....	4.2	3.9	.....
5	.....	4.5	6.2	5.5	5.5	4.3	.....	.....	.....	4.0	3.9	4.0
6	.....	4.5	6.0	5.6	5.4	4.2	.....	.....	.....	3.8	3.9	3.9
7	.....	4.4	5.5	5.7	5.4	4.2	.....	.....	.....	3.8	.....	3.8
8	.....	4.4	5.4	5.9	5.3	4.1	.....	.....	.....	3.8	3.9	3.8
9	.....	4.5	5.4	6.1	5.3	4.1	.....	.....	.....	3.8	3.9	4.0
10	.....	4.4	5.5	6.0	5.4	4.0	.....	.....	.....	3.8	4.1	4.5
11	6.4	4.4	5.5	6.0	5.3	4.0	.....	.....	.....	3.7	4.2	4.4
12	6.4	4.5	5.4	6.1	.....	4.0	.....	.....	.....	3.7	4.2	4.4
13	6.5	4.5	5.4	6.0	5.3	4.0	.....	.....	.....	3.7	4.2	4.0
14	6.4	4.6	5.4	5.3	5.2	4.0	.....	.....	.....	3.7	4.0	3.9
15	6.4	4.6	5.5	5.2	5.1	4.0	.....	.....	.....	3.7	3.9	3.8
16	6.5	4.3	5.4	6.0	5.0	4.0	.....	.....	.....	3.7	3.9	3.8
17	6.4	4.4	5.7	6.0	5.0	4.0	.....	.....	.....	3.6	4.0	3.8
18	6.4	4.5	5.8	6.0	5.0	4.0	.....	.....	.....	3.6	4.0	3.8
19	6.5	4.4	5.9	6.3	5.0	3.9	.....	.....	.....	3.6	4.0	.....
20	6.7	4.4	6.0	6.3	5.0	3.9	.....	.....	.....	3.7	4.0	.....
21	7.9	4.4	6.0	6.3	4.9	3.9	.....	.....	.....	3.7	4.0	3.8
22	9.1	4.5	5.2	6.4	4.8	3.9	.....	.....	.....	3.7	4.2	3.9
23	7.8	4.4	6.1	6.3	4.8	3.9	.....	.....	.....	3.8	4.5	4.1
24	6.6	4.5	6.1	6.3	4.8	3.9	.....	.....	.....	3.8	.....	4.0
25	6.6	4.7	5.2	6.4	4.8	3.9	.....	.....	.....	3.8	4.1	.....
26	6.6	4.6	5.9	6.3	.....	3.9	.....	.....	3.7	3.9	4.1	.....
27	6.4	4.6	5.7	6.4	4.6	3.9	.....	.....	.....	3.9	4.1	3.8
28	6.1	4.6	5.6	6.5	4.6	3.9	.....	.....	.....	3.9	4.2	3.8
29	5.2	.....	5.4	6.5	4.5	.....	.....	.....	.....	3.9	4.2	3.8
30	4.8	.....	5.5	6.6	4.4	.....	.....	.....	.....	3.9	4.0	3.8
31	5.0	.....	5.5	.....	4.4	.....	.....	.....	.....	3.9	.....	3.8

NOTE.—Heavy ice jam below gage Jan. 1 to about Feb. 1; ice was not taken out by the rise of Jan. 20 to 23, but it became gradually thinner; ice 9 inches thick Feb. 5 and 6 inches thick Feb. 10; ice went out Feb. 16. Relation between gage height and discharge probably not appreciably affected by ice in December.

Readings suspended June 29 to Sept. 30 as gage could not be read easily.

Gage heights for 1910 may have been slightly affected by the raising of a dam which diverts water into a mill canal about 250 feet below the gage.

Daily discharge, in secona-feet, of Chewaucan River at Paisley, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	154	1,530	387	616	120	.....	.....	.....	35	54	54
2	.....	125	662	355	495	104	.....	.....	.....	35	54	65
3	.....	96	1,050	295	421	104	.....	.....	.....	77	54	137
4	.....	102	992	325	387	104	.....	.....	.....	90	54	100
5	.....	116	662	387	387	104	.....	.....	.....	65	54	65
6	.....	116	573	421	355	90	.....	.....	.....	44	54	54
7	.....	102	387	457	355	90	.....	.....	.....	44	54	44
8	.....	108	355	533	325	77	.....	.....	.....	44	54	44
9	.....	123	355	616	325	77	.....	.....	.....	44	54	65
10	.....	108	387	573	355	65	.....	.....	.....	44	77	137
11	.....	120	387	573	325	65	.....	.....	.....	35	90	120
12	.....	137	355	616	325	65	.....	.....	.....	35	90	120
13	.....	137	355	573	325	65	.....	.....	.....	35	90	65
14	.....	156	355	325	295	65	.....	.....	.....	35	65	54
15	.....	156	387	295	268	65	.....	.....	.....	35	54	44
16	.....	104	355	573	243	65	.....	.....	.....	35	54	44
17	.....	120	457	573	243	65	.....	.....	.....	27	65	44
18	.....	137	495	573	243	65	.....	.....	.....	27	65	44
19	.....	120	533	712	243	54	.....	.....	.....	27	65	44
20	104	120	573	712	243	54	.....	.....	.....	35	65	44
21	457	120	573	712	220	54	.....	.....	.....	35	65	44
22	1,180	137	295	764	197	54	.....	.....	.....	35	90	54
23	495	120	616	712	197	54	.....	.....	.....	44	137	77
24	156	137	616	712	197	54	.....	.....	.....	44	104	65
25	156	176	295	764	197	54	.....	.....	.....	44	77	54
26	156	156	533	712	176	54	.....	.....	35	54	77	54
27	220	156	457	764	156	54	.....	.....	.....	54	77	44
28	220	156	421	818	156	54	.....	.....	.....	54	90	44
29	90	.....	355	818	137	50	.....	.....	.....	54	90	44
30	77	.....	387	874	120	50	.....	.....	.....	54	65	44
31	137	.....	387	.....	120	.....	.....	.....	.....	54	.....	44

NOTE.—Daily discharge determined from a discharge rating curve well defined between 35 and 1,000 second-feet. Mean discharge Jan. 1 to 19 estimated at 70 second-feet. Ice obstruction Jan. 20 to Feb. 10 estimated from the observer's notes; daily discharge for this period only approximate.

Monthly discharge of Chewaucan River, at Paisley, Oreg., for 1910.

[Drainage area, 272 square miles.]

Month	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Mean per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	1,180	*a* 70	154	0.566	0.65	9,470	D.
February	156	96	129	.474	.49	7,160	C.
March	1,530	355	521	1.92	2.21	32,000	A.
April	874	295	584	2.15	2.40	34,800	A.
May	616	120	279	1.03	1.19	17,200	A.
June	120	.....	69.8	.257	.29	4,150	A.
July	.....	.....	*b* 35.0	.129	.15	2,150	C.
August	.....	.....	*b* 23.0	.085	.10	1,410	D.
September	.....	.....	*b* 35.0	.129	.14	2,080	C.
October	90	27	45.0	.165	.19	2,770	A.
November	90	54	71.3	.262	.29	4,240	A.
December	137	44	63.1	.232	.27	3,880	B.
The year	1,530	.....	168	.617	8.37	121,000	

a Estimated. *b* Estimated by comparison with records for previous years.

SUMMER LAKE BASIN.

GENERAL FEATURES.

Summer Lake is a strongly alkaline body of water with a surface area of about 70 square miles, at an elevation of 4,300 feet above sea level. The water is derived largely from Ana River, a stream 7 miles long, which heads in five large springs on the northern border of the valley. These springs supply a continuous flow of about 145 second-feet. The water has a nearly constant temperature of 65°.

The water surface of the upper spring is 39.3 feet above normal water surface in Summer Lake; the water surface of the fifth or lower spring is 7.5 feet above that of Summer Lake. Below the second spring an attempt has been made to raise the water by an earth dam sufficiently high to divert it into a ditch for the irrigation of lands on the right or south side of the stream. This dam will raise the water 58 feet. The project is being developed by persons owning desert claims in the vicinity.

The agricultural development in this basin is limited to a narrow strip lying at the foot of a high escarpment along the western shore of Summer Lake. This narrow strip is the most favored section in central Oregon and in it agriculture has been practiced extensively since 1848. The escarpment is effective protection against the cold winds from the west and north, which in passing over make an eddy drawing the warm air of the lake over the lands and serving to equalize the temperature. The region has long been famous for its fruit. Apples, pears, peaches, cherries, and berries of all kinds are grown in abundance.

Along the eastern shore of the lake and extending eastward into the wide valley adjoining Chewaucan marsh is a large area of agricultural land, a portion of which could undoubtedly be watered from Ana River and another portion from Chewaucan River.

ANA RIVER NEAR SUMMER LAKE, OREG.

This station, which is located near the head of Ana River, in the NW. ¼ SE. ¼ sec. 6, T. 30 S., R. 17 E., about 6 miles northwest of the town of Summer Lake, Oreg., was established March 28, 1905. No continuous observations of gage heights were obtained until January 14, 1909. It was found, however, that fluctuations in the gage heights were caused by temporary diversion dams in the stream about 3 miles below the gage. Discharge measurements indicate that the flow is practically constant and equal to 145 second-feet. On this account observations of gage heights were suspended February 9, 1910.

The following measurement was made by Allen and Davenport:

September 25, 1910: Width, 27 feet; area, 68 square feet; gage height, 3.95 feet; discharge, 141 second-feet.

SILVER LAKE BASIN.

GENERAL FEATURES.

Silver Lake is a body of fresh water approximately 15 square miles in area, at an elevation of 4,340 feet. The western, southern, and eastern borders of the lake consist of high escarpments; to the northwest is Pauline marsh.

Silver Creek, Bridge Creek, and Bear Creek flow from Yamsay and Hagar mountains northward into Pauline marsh and thence southeastward into Silver Lake.

The water surface in the lake fluctuates considerably. During a succession of high-water years the water rises sufficiently to overflow into Thorn Lake and cover a small portion of the desert to the east. This fact perhaps accounts for the freshness of the lake. After a succession of dry years the lake surface diminishes and the waters become more and more alkaline until freshened again by another overflow.

The principal agricultural development at the present consists of hay lands in Pauline marsh and small irrigated tracts bordering the streams. During recent years all land suitable for agriculture has been taken as homesteads, and dry farming has been practiced with more or less success.

To the northeast and practically connected with Summer Lake drainage basin is Christmas Lake Valley, a flat alluvial area comprising 300,000 acres. This valley has no surface streams, but contains two or three small lakes. Alkaline Flat, near the northeastern part of the valley, is an intermittent lake; south of it Christmas Lake is a perennial body of water, at an elevation of 4,296 feet. North of Christmas Lake is Fossil Lake, and in the extreme southwestern portion and practically connected with Silver Lake basin is Thorn Lake. Nearly all the lands of Christmas Lake Valley have been taken as homesteads. Dry farming is practiced extensively and good crops of grain and potatoes and other crops have been raised. Water for domestic purposes is found in comparatively shallow wells. Near the eastern border of the valley, however, wells 40 feet in depth have encountered salt water.

SILVER CREEK NEAR SILVER LAKE, OREG.

This station, which is located 1½ miles southwest of Silver Lake post office, in sec. 28, T. 28 S., R. 14 E., was established December 29, 1904, abandoned March 31, 1907, for lack of funds, and reestablished January 11, 1909.

The gage is an inclined staff on the right bank. The elevation of the gage has been verified from time to time by means of a bench mark near it at elevation 18.12. The gage was found in April,

1910, to have been raised from the true position, and some of the 1909 gage readings are therefore liable to error.

Discharge measurements are made from a cable near the gage.

The bed and banks of the stream are fairly permanent. The country through which the creek flows is more or less arid, and the natural summer flow of nearly all the streams is appropriated for present irrigation requirements. Any additional development will require storage. Several fairly good storage sites are available on Silver Creek, and below it lie areas of agricultural land that could easily be irrigated from stored waters.

The conditions at the station are favorable for good results and the records are believed to be reliable.

Discharge measurements of Silver Creek near Silver Lake, Oreg., for 1909–10.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1909.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 28	R. B. Post	45	94	3.48	292
Dec. 12	do	17	26	[b] 1.29	42
1910.					
Apr. 29	L. R. Allen	23	38	1.64	78
Sept. 24[a]	Allen and Davenport	20	19.2	.70	14.9
Nov. 22	R. W. Davenport	19	21.1	.81	21.4

[a] Measured by wading at regular section.
[b] This gage height supersedes that published in Water-Supply Paper 270, p. 179.

Daily gage height, in feet, of Silver Creek near Silver Lake, Oreg., for 1909.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		1.7	11		1.2	21		1.2
2		1.55	12		1.2	22		1.4
3		1.55	13		1.15	23		1.55
4		1.25	14		1.1	24	5.5	1.45
5		1.25	15		1.2	25	5.05	1.55
6		1.3	16		1.5	26	4.75	1.25
7		1.25	17		1.5	27	4.2	1.2
8		1.8	18		1.5	28	1.9	.9
9		1.25	19		1.15	29	2.0	1.0
10		1.2	20		1.15	30	2.05	1.2
						31		1.15

Daily gage height, in feet, of Silver Creek near Silver Lake, Oreg., for 1910.

[J. H. Gowdy, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.05	1.45	3.15	2.6	1.75	1.0	0.9	0.75	0.7	0.7	0.7	1.0
2	.9	2.4	3.9	2.1	1.7	.95	.9	.75	.7	.7	.7	1.0
3	1.9	2.75	4.75	2.1	1.7	.95	.9	.75	.7	.7	.7	1.1
4	2.3	2.8	4.35	2.05	1.7	.9	.85	.75	.7	.7	.7	1.05
5	2.1	2.95	3.9	2.5	1.6	.9	.85	.75	.7	.7	.7	1.05
6	1.5	2.75	4.25	2.6	1.5	.9	.8	.75	.7	.7	.7	1.0
7	1.0	2.6	4.7	2.6	1.5	.9	.8	.75	.7	.7	.7	1.0
8	.9	2.1	4.65	3.4	1.5	.9	.8	.7	.7	.7	.75	1.0
9	.9	1.45	2.95	4.0	1.45	.9	.8	.7	.7	.7	.85	1.0
10	.9	1.25	4.65	4.05	1.4	.9	.8	.7	.7	.7	.85	1.0
11	.9	1.35	5.05	3.15	1.3	.9	.8	.7	.7	.7	.9	.95
12	.9	1.6	3.8	2.6	1.25	.9	.8	.7	.7	.75	.8	.95
13	.95	1.65	3.85	2.6	1.2	.9	.8	.7	.7	.75	.8	.9
14	.9	1.65	3.95	2.4	1.15	.9	.75	.7	.7	.75	.8	.85
15	.9	1.15	3.9	2.3	1.15	.9	.75	.7	.7	.75	.8	.85
16	.9	1.35	4.0	2.3	1.15	.9	.75	.7	.75	.7	.75	.85
17	.9	1.35	3.95	2.3	1.15	.9	.75	.7	.75	.7	.75	.85
18	.95	1.55	4.0	2.4	1.1	.9	.75	.7	.95	.7	.7	.85
19	.9	1.7	4.35	2.3	1.1	.9	.75	.7	1.0	.7	.7	.8
20	.95	1.65	4.15	2.2	1.1	.85	.75	.7	1.2	.7	.7	.8
21	1.0	1.6	4.1	2.2	1.1	.85	.75	.7	1.05	.7	.7	.8
22	3.05	1.45	3.8	2.2	1.1	.85	.75	.7	1.0	.7	.7	.75
23	2.5	1.25	3.4	2.0	1.1	.85	.75	.7	.9	.7	.7	.75
24	2.3	3.6	3.15	2.0	1.05	.85	.75	.7	.8	.7	.7	.75
25	2.2	1.25	2.65	1.9	1.05	.85	.75	.7	.7	.7	.7	.75
26	2.05	1.35	3.15	1.9	1.0	.85	.75	.7	.7	.7	.7	.7
27	1.6	1.15	2.75	1.95	1.0	.85	.75	.7	.7	.7	.8	.7
28	1.6	1.55	2.5	1.9	1.0	.85	.75	.7	.7	.7	.8	.65
29	1.45	.....	2.5	1.65	1.0	.85	.75	.7	.7	.7	.85	.6
30	1.6	.....	2.65	1.65	1.0	.85	.75	.7	.7	.7	.9	.6
31	1.55	.....	2.5	.....	1.0	.....	.75	.7	.....	.7	.....	.6

NOTE.—Gage heights Nov. 24 to Dec. 31, 1909, supersede those for the same period published in Water-Supply Paper 270, p. 179; gage was found to be in error Apr. 29, 1910, and was corrected. The best evidence indicates that the change occurred about the time of the flood of November, 1909, and hence gage heights are uncertain Nov., 1909, to Apr. 29, 1910. Creek probably frozen Jan. 1 to Feb. 1, 1910. Rise Feb. 2 to 8 caused by an ice jam; probably no ice after this except a little during the latter part of December.

On Apr. 29, 1910, the gage was found to have been moved from its true elevation and was corrected; gage heights prior to this date have been corrected but are somewhat uncertain.

Daily discharge, in second-feet, of Silver Creek near Silver Lake, Oreg., for 1909–10.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	.....	24	29	199	177	48	19	15	15	13	15	80
2	.....	22	24	210	210	41	19	13	13	13	13	68
3	.....	56	38	245	257	41	19	11	13	15	13	68
4	.....	56	64	147	352	48	22	11	13	13	13	44
5	.....	68	52	117	368	41	24	11	13	15	13	44
6	.....	64	52	107	269	35	26	13	15	15	11	48
7	.....	52	41	117	221	35	19	11	13	15	11	44
8	.....	41	29	147	188	29	22	11	11	13	11	89
9	.....	41	26	177	188	41	19	11	11	13	13	44
10	.....	29	29	199	167	29	24	11	13	13	13	41
11	.....	15	24	157	147	26	22	11	11	13	13	41
12	.....	24	22	316	107	26	19	13	11	15	11	41
13	.....	26	24	245	107	24	19	13	11	15	13	38
14	.....	26	41	269	107	29	19	11	11	15	22	35
15	.....	24	98	295	98	26	15	11	11	13	29	41
16	30	78	147	309	107	29	13	11	13	15	32	64
17	84	107	167	337	89	29	15	13	11	15	26	48
18	117	102	98	309	64	29	13	11	11	11	29	48
19	107	48	56	257	127	38	13	11	11	11	32	26
20	157	44	60	257	89	35	15	11	13	11	41	26
21	210	35	41	177	89	29	13	13	13	11	72	29
22	147	26	52	157	72	24	15	13	13	11	127	41
23	89	26	41	167	64	24	17	11	13	11	865	52
24	72	26	41	257	64	22	15	11	13	11	652	44
25	44	19	107	221	48	19	15	13	13	11	540	52
26	29	26	117	309	56	22	13	15	15	11	473	32
27	64	24	167	295	56	19	13	15	13	11	368	29
28	38	35	199	257	64	19	13	13	13	13	98	15
29	19	.....	199	210	48	19	15	11	13	11	107	19
30	26	.....	107	182	89	19	15	11	13	11	112	29
31	26	.....	194	.....	48	.....	15	11	.....	13	.....	26
1910.												
1	22	44	227	167	84	29	24	17	15	15	15	29
2	15	50	323	117	80	26	24	17	15	15	15	29
3	80	50	473	117	80	26	24	17	15	15	15	35
4	117	60	394	112	80	24	22	17	15	15	15	32
5	98	60	323	157	72	24	22	17	15	15	15	32
6	48	60	376	167	64	24	19	17	15	15	15	29
7	19	60	462	167	64	24	19	17	15	15	15	29
8	15	60	451	257	64	24	19	15	15	15	17	29
9	15	60	204	337	60	24	19	15	15	15	22	29
10	15	44	451	344	56	24	19	15	15	15	22	29
11	15	52	540	227	48	24	19	15	15	15	24	26
12	15	72	309	167	44	24	19	15	15	17	19	26
13	17	76	316	167	41	24	19	15	15	17	19	24
14	15	76	330	147	38	24	17	15	15	17	19	22
15	15	38	323	137	38	24	17	15	15	17	19	22
16	15	52	337	137	38	24	17	15	17	15	17	22
17	15	52	330	137	38	24	17	15	17	15	17	22
18	17	68	337	147	35	24	17	15	26	15	15	22
19	15	80	394	137	35	24	17	15	29	15	15	19
20	17	76	360	127	35	22	17	15	41	15	15	19
21	19	72	352	127	35	22	17	15	32	15	15	19
22	194	60	309	127	35	22	17	15	29	15	15	17
23	137	44	257	107	35	22	17	15	24	15	15	17
24	117	282	227	107	32	22	17	15	19	15	15	17
25	107	44	172	98	32	22	17	15	15	15	15	17
26	94	52	227	98	29	22	17	15	15	15	15	15
27	56	38	182	102	29	22	17	15	15	15	19	15
28	56	68	157	98	29	22	17	15	15	15	19	13
29	44	.....	157	76	29	22	17	15	15	15	22	11
30	56	.....	172	76	29	22	17	15	15	15	24	11
31	52	.....	157	.....	29	.....	17	15	.....	15	.....	11

NOTE.—Daily discharge determined from a fairly well-defined discharge rating curve. Values for 1909 supersede those published in Water-Supply Paper 270, p. 180.

The following estimates and corrections have been made: Jan. 1 to 16, 1909, discharge estimated 30 second-feet. Gage heights Dec. 16, 1909, to Feb. 1, 1910, reduced 0.2 foot before applying rating curve, to allow for ice obstruction. Discharge Feb. 2 to 8 interpolated on account of ice jam.

Monthly discharge of Silver Creek near Silver Lake, Oreg., for 1909–10.

[Drainage area, 221 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Mean per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1909.							
January	210	19	55.1	0.249	0.29	3,390	C.
February	107	15	41.6	.188	.20	2,310	B.
March	199	22	77.0	.348	.40	4,730	B.
April	337	107	222	1.00	1.12	13,200	B.
May	368	48	133	.602	.69	8,180	B.
June	48	19	27.5	.124	.14	1,640	B.
July	26	13	17.3	.078	.09	1,060	B.
August	15	11	12.0	.054	.06	738	B.
September	15	11	12.5	.057	.06	744	B.
October	15	11	12.8	.058	.07	787	B.
November	865	11	126	.570	.64	7,500	B.
December	80	15	43.4	.196	.23	2,670	C.
The year	865	11	64.9	.294	3.99	46,900	
1910.							
January	194	15	49.4	0.224	0.26	3,040	C.
February	282	38	66.1	.299	.31	3,670	C.
March	473	157	311	1.41	1.63	19,100	C.
April	344	76	150	.679	.76	8,930	B.
May	84	29	46.4	.210	.24	2,850	B.
June	29	22	23.6	.107	.12	1,400	B.
July	24	17	18.5	.084	.10	1,140	B.
August	17	15	15.5	.070	.08	953	B.
September	41	15	18.3	.083	.09	1,090	B.
October	17	15	15.3	.069	.08	941	B.
November	24	15	17.3	.078	.09	1,030	B.
December	35	11	22.2	.100	.12	1,360	B.
The year	473	11	62.8	.284	3.88	45,500	

BRIDGE CREEK NEAR SILVER LAKE, OREG.

Bridge Creek lies between Silver and Bear creeks and is tributary to the latter near the edge of Pauline Marsh.

The gaging station, which is located at the county bridge 2 miles west of Silver Lake, Oreg., in SW. ¼ sec. 20, T. 28 S., R. 14 E., was established January 21, 1905, discontinued July 21, 1906, and reestablished in cooperation with the United States Forest Service September 24, 1910.

The staff gage was established at the same datum as that of the original gage.

Discharge measurements are made by wading near the gage.

The bed of the creek shifts, and the occasional gage readings that have been obtained since the station was reestablished serve only to give a general idea of the behavior of the stream.

Discharge measurements of Bridge Creek near Silver Lake, Oreg., for 1910.

Date.	Hydrographer.	Area of section.	Gage height.	Discharge.
		Sq. ft.	*Feet.*	*Sec.-ft.*
Sept. 24[a]	Allen and Davenport	[a] 0.50	1.60	[a] 0.40
Nov. 22	R. W. Davenport	3.0	1.72	1.40

[a] Estimated.

Daily gage height, in feet, of Bridge Creek near Silver Lake, Oreg., in 1910.

[U. S. Forest Service, observer.]

Oct.	6	1.6
	15	1.6
	22	1.6
Nov.	11	1.7
	17	1.6
	23	1.7
Dec.	3	1.7
	10	1.6
	17[1]	2.3

BEAR CREEK[2] NEAR SILVER LAKE, OREG.

This station, which is located 3 miles southwest of Silver Lake post office, at the county highway bridge, in sec. 17, T. 28 S., R. 14 E., was established January 21, 1905, discontinued July 21, 1906, and reestablished January 11, 1909.

Water is diverted by a dam above the station, and below several brush dams, put in each year, divert water for use in small ditches or for flooding hay lands. The brush dams cause backwater at the gage. Gage heights have been corrected for effect of backwater and daily and monthly discharge records for the whole period of observations are published herewith.

The results obtained from observations at this station are only approximate and chiefly of local interest. The waters of the stream are appropriated during the summer months for irrigation, and have been the cause of considerable litigation.

[1] Creek frozen Dec. 15 to 31.

[2] Locally known as Buck Creek.

Discharge measurements of Bear Creek near Silver Lake, Oreg., in 1905–1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1905.					
Jan. 24	I. Lande	7	4.6	4.15	14.4
Feb. 23	.....do	11	7.4	4.60	23.6
Mar. 17	.....do	8	5.1	4.00	11.7
May 31	.....do	27	37.0	5.48	50.0
June 15	.....do	28	25.0	5.25	46.0
Aug. 7	.....do	11	8.7	3.90	6.3
Oct. 4	.....do	10	7.0	3.85	5.0
24	.....do	10	6.1	3.92	6.4
Nov. 11	.....do	9	6.4	4.03	6.8
1906.					
Apr. 9	I. Lande	10.5	13	4.48	27
May 29	.....do	17.5	22	4.87	30
June 22	Stevens and Lande	18.7	29	[a] 6.23	65
1909.					
Apr. 28	R. B. Post	34	83.4	5.79	39.7
1910.					
Apr. 29	L. R. Allen	34.5	10.6	6.05	56.1
Sept. 24	Allen and Davenport	15	8.15	3.93	6.6
Nov. 22	R. W. Davenport	16.5	11.0	4.09	10.5

[a] Observer's gage reading of 5.35 has been used in computations.

NOTE.—Most of the low-water measurements have been made by wading at different sections.

Daily gage height, in feet, of Bear Creek near Silver Lake, Oreg., for 1905, 1906, 1909, and 1910.

[Cliff Smith, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.[a]												
1	.....	4.1	3.95	4.1	5.0	5.45	5.05	3.9	3.8	3.85	3.9	3.9
2	.....	4.1	4.35	4.0	4.95	5.4	5.0	3.9	3.8	3.85	3.9	3.9
3	.....	4.1	4.55	3.95	4.9	5.45	4.95	3.85	3.8	3.85	3.9	3.9
4	.....	4.1	4.0	3.95	4.9	5.45	4.95	3.85	3.8	3.85	3.9	3.9
5	.....	4.1	4.0	3.95	4.9	5.35	4.9	3.8	3.8	3.85	3.6	3.9
6	.....	4.1	3.95	4.0	4.95	5.25	4.9	3.9	3.8	3.85	3.6	3.9
7	.....	4.1	3.95	4.0	4.95	5.2	4.9	3.9	3.8	3.95	3.8	3.9
8	.....	4.1	3.95	4.0	5.05	5.4	4.85	3.9	3.8	3.95	3.95	3.9
9	.....	4.1	3.95	4.0	5.05	5.4	4.8	3.85	3.8	3.95	4.1	3.9
10	.....	4.1	3.95	4.0	5.0	5.4	4.8	3.85	3.8	3.9	4.1	3.7
11	.....	4.1	3.95	4.0	4.95	5.45	4.8	3.8	3.8	3.9	4.1	3.65
12	.....	4.1	3.95	4.0	5.0	5.45	4.75	3.8	3.8	3.9	4.0	3.65
13	.....	4.1	4.0	4.0	4.95	5.4	4.75	3.8	3.8	3.9	4.0	3.7
14	.....	4.1	4.0	4.85	4.95	5.35	4.8	3.8	3.8	3.9	3.9	3.85
15	.....	4.1	3.95	4.85	5.05	5.3	4.8	3.8	3.8	3.9	3.9	3.9
16	.....	4.1	4.0	4.85	5.25	5.2	4.8	3.85	3.8	3.9	3.9	3.95
17	.....	4.55	4.0	4.85	5.05	5.05	4.8	3.85	3.8	3.9	3.9	3.95
18	.....	4.55	4.0	4.8	5.15	5.05	4.8	3.85	3.75	3.9	3.85	3.95
19	.....	4.5	4.0	4.8	5.15	5.0	4.8	3.85	3.75	3.9	3.75	4.0
20	.....	4.85	4.0	4.8	5.1	4.95	3.9	3.8	3.75	3.9	3.7	4.0
21	4.2	5.0	4.0	4.8	5.0	5.35	3.9	3.8	3.75	3.9	3.7	4.1
22	4.2	4.8	4.0	4.8	4.95	5.35	3.9	3.8	3.75	3.9	3.6	4.1
23	4.2	4.6	4.05	4.75	4.9	5.3	3.9	3.8	3.75	3.9	3.65	4.0
24	4.4	4.4	3.95	4.8	5.0	5.3	3.9	3.8	3.75	3.9	3.7	3.6
25	4.4	4.4	3.95	4.95	5.1	5.25	3.9	3.8	3.75	3.9	3.7	4.0
26	4.2	4.0	3.95	4.9	5.2	5.2	3.9	3.8	3.75	3.9	3.85	4.6
27	4.2	4.1	3.95	4.9	5.4	5.2	3.9	3.8	3.75	3.9	3.85	4.6
28	4.1	4.0	3.95	4.95	5.4	5.3	3.9	3.8	3.75	3.9	3.9	4.2
29	4.1	.....	3.95	4.75	5.4	5.25	3.9	3.8	3.75	3.9	3.9	4.2
30	4.1	.....	3.85	5.0	5.5	5.05	3.9	3.8	3.75	3.9	3.9	4.2
31	4.1	.....	3.75	.....	5.5	.....	3.9	3.8	.....	3.9	.....	4.2

[a] See Water Supply Paper 175, p. 132.

Daily gage height, in feet, of Bear Creek near Silver Lake, Oreg., for 1905, 1906, 1909, and 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.[a]												
1	4.2	4.2	4.2	4.3	5.1	4.9	5.15					
2	4.2	4.2	4.1	4.1	5.2	4.95	5.1					
3	4.2	4.0	4.1	4.1	5.3	4.95	5.2					
4	4.2	4.0	4.1	4.4	5.35	5.35	5.2					
5	4.2	4.0	4.1	4.4	5.4	5.2	5.3					
6	4.2	4.0	4.1	4.6	5.4	5.15	5.2					
7	4.2	4.2	4.1	4.6	5.45	5.0	5.2					
8	4.2	4.2	4.1	4.3	5.5	4.95	5.2					
9	4.2	4.2	4.2	4.2	5.6	5.35	5.0					
10	4.2	4.2	4.3	4.0	5.8	5.35	5.0					
11	4.2	4.2	4.3	4.25	5.9	5.4	5.0					
12	4.2	4.2	4.3	4.25	5.65	5.75	4.85					
13	4.2	4.2	4.3	4.25	5.4	5.5	4.85					
14	4.2	4.2	4.3	4.3	5.4	5.45	4.8					
15	4.2	4.2	4.3	4.35	5.3	5.4	4.4					
16	4.2	4.2	4.1	4.4	5.3	5.75	4.3					
17	4.2	4.2	4.0	4.35	5.2	5.6	4.4					
18	4.2	4.4	4.0	4.3	5.1	5.5	4.2					
19	4.2	4.4	4.1	4.9	5.0	5.5	4.1					
20	4.2	5.0	4.1	5.0	5.2	5.4						
21	4.2	5.0	4.1	5.15	5.05	5.4						
22	4.2	5.0	4.2	5.2	4.95	5.35						
23	4.2	4.4	4.2	5.2	4.7	5.2						
24	4.2	4.4	5.15	5.0	4.7	5.2						
25	4.2	4.4	5.2	4.95	5.0	5.2						
26	4.2	4.4	5.1	4.95	5.1	5.35						
27	4.2	4.4	4.6	4.9	5.1	5.5						
28	4.2	4.4	4.5	5.0	5.1	5.3						
29	4.2		4.4	5.0	5.0	5.05						
30	4.2		5.1	5.0	4.85	5.25						
31	4.2		4.95		4.9							
1909.[b]												
1		4.6	4.1	4.4	5.7	6.1	5.9	3.9	3.8	3.8	3.9	4.6
2		4.4	4.1	4.4	5.7	6.3	5.9	3.9	3.8	3.8	3.9	4.6
3		6.1	4.2	4.5	5.7	6.3	5.9	3.9	3.8	3.8	3.9	4.6
4		4.8	4.3	4.6	5.8	6.3	5.9	3.9	3.8	3.8	3.9	4.6
5		4.5	4.0	4.5	5.9	6.3	5.9	3.9	3.8	3.8	3.9	4.4
6		4.2	4.1	4.5	5.9	6.3	5.9	3.9	3.8	3.8	3.9	4.4
7		4.3	4.1	4.4	5.9	6.2	5.9	3.9	3.8	3.8	3.9	4.6
8		4.3	4.2	4.3	5.9	6.1	5.8	3.9	3.8	3.8	3.9	4.4
9		4.2	4.0	4.3	5.9	6.1	5.8	3.9	3.8	3.8	3.9	4.7
10		4.2	4.0	4.5	5.9	6.1	5.8	3.9	3.8	3.8	3.9	4.6
11		4.3	4.0	4.6	5.9	6.1	5.8	3.9	3.8	3.8	3.9	4.4
12	3.9	4.3	4.0	4.6	5.9	6.1	5.8	3.9	3.8	3.8	3.9	4.4
13	3.9	4.3	4.0	4.6	5.8	6.2	5.7	3.9	3.8	3.8	3.9	4.4
14	3.9	4.2	4.0	4.7	5.8	6.2	5.7	3.9	3.8	3.8	3.9	4.2
15	4.2	4.2	4.6	4.7	5.8	6.2	5.7	3.8	3.8	3.8	3.9	4.0
16	4.7	5.3	4.6	4.7	5.8	6.2	5.7	3.8	3.8	3.8	3.9	4.0
17	5.2	7.5	4.6	5.9	5.9	6.2	5.7	3.8	3.8	3.8	4.0	4.0
18	6.0	5.9	4.1	5.8	5.9	6.2	4.3	3.8	3.8	3.8	4.0	4.0
19	5.7	4.9	4.0	5.8	5.9	6.2	4.2	3.8	3.8	3.8	4.0	4.2
20	7.6	4.5	4.0	5.8	5.9	6.2	4.1	3.8	3.8	3.8	4.3	4.2
21	8.0	4.0	4.0	5.7	5.9	6.2	4.1	3.8	3.8	3.8	4.5	4.2
22	6.2	4.0	4.0	5.7	5.9	6.0	4.1	3.8	3.8	3.8	5.0	4.2
23	6.4	3.9	4.0	5.7	5.9	6.0	4.1	3.8	3.8	3.8	8.4	4.2
24	5.6	4.1	4.0	5.7	5.9	6.0	4.1	3.8	3.8	3.9	7.1	4.2
25	4.9	3.8	4.4	5.7	5.9	6.0	4.0	3.8	3.8	3.9	6.1	4.2
26	4.6	4.0	4.4	5.8	6.0	6.0	4.0	3.8	3.8	3.9	5.4	4.3
27	4.2	4.1	4.3	5.8	6.0	6.0	4.0	3.8	3.8	3.9	5.0	4.3
28	4.6	4.0	4.4	5.8	6.0	5.9	4.0	3.8	3.8	3.9	4.9	4.4
29	4.2		4.6	5.7	6.0	5.9	4.0	3.8	3.8	3.9	4.7	4.5
30	4.1		4.4	5.7	6.0	5.9	4.0	3.8	3.8	3.9	4.6	4.5
31	4.4		4.2		6.1		4.0	3.8		3.9		4.5

[a] See Water-Supply Paper 212, p. 89.
[b] Backwater from irrigation dam April 17 to July 17.

Daily gage height, in feet, of Bear Creek near Silver Lake, Oreg., for 1905, 1906, 1909, and 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	4.5	5.5	7.7	4.6	5.9	6.0	5.5					
2	4.5	5.0	7.5	4.6	6.0	6.0	5.8					
3	4.6	4.5	6.0	4.5	6.0	6.0	5.8					4.15
4	4.6	4.4	6.1	4.4	6.0	6.0	5.6					
5	4.6	4.4	5.9	4.4	5.9	6.0	5.6					
6	4.6	5.0	5.3	4.4	5.8	6.0	5.6			4.05		
7	4.6	5.0	5.0	4.4	5.9	5.9						
8	4.6	5.0	5.0	4.4	5.9	5.9						
9	4.6	4.8	4.8	4.4	6.1	5.9						
10	5.0	4.8	4.8	4.5	6.1	5.9						4.15
11	5.0	4.7	4.8	4.5	6.0	5.9					4.35	
12	4.4	4.7	4.9	4.5	6.0	5.9						
13	4.4	5.7	4.9	4.5	6.0	5.9						
14	4.4	7.0	5.0	4.5	6.0	5.9						
15	4.4	5.6	5.0	4.5	6.0	5.9				4.05		
16	4.4	4.7	5.0	5.8	6.0	5.9						
17	4.4	4.5	5.0	5.9	6.0	5.9					4.15	4.15
18	4.4	4.5	5.0	5.9	6.0	5.9						
19	4.4	4.5	5.0	6.0	6.0	5.8						
20	4.4	4.6	5.1	6.0	6.0	5.8						
21	4.4	4.5	5.1	6.0	6.0	5.8						
22	4.4	4.5	5.1	6.0	6.0	5.8				4.05	4.1	
23	5.0	4.5	5.1	6.0	6.0	5.8					4.15	
24	6.8	7.0	5.2	6.0	6.0	5.8			3.93			
25	5.2	6.8	5.1	6.1	6.0	5.8						
26	5.2	5.9	5.1	6.2	6.0	5.7						
27	4.7	5.6	4.9	6.2	6.0	5.7						
28	4.7	8.4	4.7	6.1	6.0	5.6						
29	4.7		4.7	6.0	6.0	5.5						
30	4.7		4.6	6.0	6.0	5.5						
31	6.4		4.6		6.0							

NOTE.—Creek frozen Jan. 1 to Mar. 1 and during part of December preceding; Feb. 6, ice about 20 inches thick; relation of gage height to discharge probably little affected by ice after the thaw at the end of February.

The rise Apr. 16 was caused by backwater from a temporary brush dam which is placed each year to divert water into canals. The dam was not removed until after records were suspended July 6. No records July 6 to Sept. 24; records after Sept. 24 made by United States Forest Service. The maximum stage was 10.0 feet at 8 p. m. Feb. 24.

Daily discharge, in second-feet, of Bear Creek near Silver Lake, Oreg., for 1905, 1906, 1909, and 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1		12	8	12	19	50	27	6	4	5	6	6
2		12	21	9	17	48	25	6	4	5	6	6
3		12	29	8	17	50	21	5	4	5	6	6
4		12	9	8	17	52	21	5	4	5	6	6
5		12	9	8	17	48	19	4	4	5	2	6
6		12	8	9	19	42	19	6	4	5	2	6
7		12	8	9	19	40	17	6	4	8	4	6
8		12	8	9	25	50	15	6	4	8	4	6
9		12	8	9	25	50	14	5	4	8	5	6
10		12	8	9	23	52	12	5	4	6	6	3
11		12	8	9	21	55	12	4	4	6	7	2.5
12		12	8	9	23	55	9	4	4	6	6	2.5
13		12	9	9	23	52	9	4	4	6	6	3
14		12	9	9	23	52	9	4	4	6	6	5
15		12	8	9	27	50	9	4	4	6	6	6
16		12	9	9	35	45	9	5	4	6	6	6
17		29	9	9	27	35	8	5	4	6	6	6
18		29	9	9	31	35	8	5	3.5	6	5	6
19		27	9	9	31	33	6	5	3.5	6	3.5	6
20		42	9	9	25	31	6	4	3.5	6	3	6

Daily discharge, in second-feet, of Bear Creek near Silver Lake, Oreg., for 1905, 1906, 1909, and 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
21	15	50	9	9	27	48	6	4	3.5	6	3	6
22	15	40	9	9	25	48	6	4	3.5	6	2	6
23	15	31	10	9	23	45	6	4	3.5	6	2.5	6
24	23	23	8	10	27	42	6	4	3.5	6	3	6
25	23	23	8	15	31	40	6	4	3.5	6	3	6
26	15	9	8	14	35	38	6	4	3.5	6	5	7
27	15	12	8	14	45	35	6	4	3.5	6	5	7
28	12	9	8	17	45	40	6	4	3.5	6	6	7
29	12	.....	8	10	48	38	6	4	3.5	6	6	7
30	12	.....	5	19	52	27	6	4	3.5	6	6	7
31	12	.....	4	.....	52	.....	6	4	.....	6	.....	7
1906.												
1	8	8	8	19	31	33	58	.....	.....	.....	.....	.....
2	8	8	6	12	35	35	55	.....	.....	.....	.....	.....
3	8	4	6	12	40	35	60	.....	.....	.....	.....	.....
4	8	4	6	23	45	55	60	.....	.....	.....	.....	.....
5	8	4	6	23	48	48	65	.....	.....	.....	.....	.....
6	8	4	6	31	48	48	60	.....	.....	.....	.....	.....
7	8	8	6	31	50	40	60	.....	.....	.....	.....	.....
8	8	8	6	19	52	38	60	.....	.....	.....	.....	.....
9	8	8	8	15	58	58	50	.....	.....	.....	.....	.....
10	8	8	10	9	71	58	50	.....	.....	.....	.....	.....
11	8	8	10	17	77	62	50	.....	.....	.....	.....	.....
12	8	8	10	17	62	83	42	.....	.....	.....	.....	.....
13	8	8	10	17	50	68	42	.....	.....	.....	.....	.....
14	8	8	10	19	50	65	40	.....	.....	.....	.....	.....
15	8	8	10	21	45	62	23	.....	.....	.....	.....	.....
16	8	8	6	23	45	83	19	.....	.....	.....	.....	.....
17	8	8	4	21	40	77	23	.....	.....	.....	.....	.....
18	8	12	4	19	38	71	15	.....	.....	.....	.....	.....
19	8	12	6	19	33	71	12	.....	.....	.....	.....	.....
20	8	35	6	23	42	65	10	.....	.....	.....	.....	.....
21	8	35	12	29	35	65	10	.....	.....	.....	.....	.....
22	8	35	15	33	31	62	10	.....	.....	.....	.....	.....
23	8	12	15	33	21	58	10	.....	.....	.....	.....	.....
24	8	12	58	25	23	58	10	.....	.....	.....	.....	.....
25	8	12	60	23	35	58	8	.....	.....	.....	.....	.....
26	8	12	55	23	40	65	8	.....	.....	.....	.....	.....
27	8	12	31	21	40	74	8	.....	.....	.....	.....	.....
28	8	12	27	27	40	62	8	.....	.....	.....	.....	.....
29	8	.....	23	27	35	50	6	.....	.....	.....	.....	.....
30	8	.....	55	27	29	60	6	.....	.....	.....	.....	.....
31	8	.....	48	.....	31	.....	6	.....	.....	.....	.....	.....
1909.												
1	6	31	12	23	35	65	35	6	4	4	6	31
2	6	23	12	23	35	77	35	6	4	4	6	31
3	6	115	15	27	35	77	35	6	4	4	6	31
4	6	40	19	31	45	77	35	6	4	4	6	31
5	6	27	9	27	50	77	35	6	4	4	6	23
6	6	15	12	27	50	77	35	6	4	4	6	23
7	6	19	12	23	50	65	35	6	4	4	6	31
8	6	19	15	19	50	60	31	6	4	4	6	23
9	6	15	9	19	50	60	27	6	4	4	6	35
10	6	15	9	27	50	60	27	6	4	4	6	31
11	6	19	9	31	50	60	27	6	4	4	6	23
12	6	19	9	31	50	60	27	6	4	4	6	23
13	6	19	9	31	45	65	23	6	4	4	6	23
14	6	15	9	35	45	65	23	6	4	4	6	15
15	15	15	31	35	45	65	23	4	4	4	6	9
16	35	65	31	35	45	65	19	4	4	4	6	9
17	60	213	31	35	50	60	19	4	4	4	9	9
18	108	101	12	31	55	60	19	4	4	4	9	9
19	89	45	9	31	55	60	15	4	4	4	9	9
20	220	27	9	31	55	60	12	4	4	4	19	9
21	249	9	9	31	55	60	12	4	4	4	27	9
22	122	9	9	31	55	50	12	4	4	4	50	9
23	136	6	9	31	55	50	12	4	4	4	281	9
24	83	12	9	31	55	50	12	4	4	6	185	9
25	45	4	23	31	55	50	9	4	4	6	115	9

Daily discharge, in second-feet, of Bear Creek near Silver Lake, Oreg., for 1905, 1906, 1909, and 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
26	31	9	23	40	60	45	9	4	4	6	71	9
27	15	12	19	40	60	45	9	4	4	6	50	9
28	31	9	23	40	60	40	9	4	4	6	45	9
29	15	.....	31	35	60	40	9	4	4	6	35	9
30	12	.....	23	40	60	40	9	4	4	6	31	9
31	23	.....	15	.....	65	.....	9	4	.....	6	.....	9
1910.												
1	9	45	227	31	50	65	23	.....	.....	8	10	14
2	9	23	213	31	55	65	35	.....	.....	8	10	14
3	12	6	108	27	55	65	35	.....	.....	8	10	14
4	12	4	115	23	55	65	27	.....	.....	8	10	14
5	12	4	101	23	55	65	27	.....	.....	8	10	14
6	12	23	65	23	50	65	27	.....	.....	10	10	14
7	12	23	50	23	50	55	26	.....	.....	10	10	14
8	12	23	50	23	50	55	24	.....	.....	10	10	14
9	12	15	40	23	65	55	22	.....	.....	10	10	14
10	27	15	40	27	65	55	20	.....	.....	10	10	14
11	27	12	40	27	60	55	20	.....	.....	10	21	14
12	6	12	45	27	60	55	18	.....	.....	10	20	14
13	6	55	45	27	60	50	16	.....	.....	10	20	14
14	6	136	50	27	65	50	14	.....	.....	10	18	14
15	6	50	50	27	65	50	12	.....	.....	10	18	14
16	6	12	50	27	65	50	12	.....	.....	10	16	14
17	6	6	50	31	65	50	10	.....	.....	10	14	14
18	6	6	50	31	65	50	10	.....	.....	10	14	14
19	6	6	50	35	65	45	10	.....	.....	10	14	14
20	6	9	55	40	65	45	10	.....	.....	10	12	14
21	6	6	55	40	65	45	9	.....	.....	10	12	14
22	6	6	55	40	65	40	9	.....	.....	10	12	14
23	27	6	55	45	65	40	9	.....	.....	10	14	12
24	129	136	60	45	65	40	9	.....	6.6	10	14	12
25	35	122	55	50	65	40	9	.....	.....	10	14	10
26	35	101	55	60	65	35	8	.....	.....	10	14	10
27	15	83	45	60	65	35	8	.....	.....	10	14	10
28	15	281	35	55	65	31	8	.....	.....	10	14	8
29	15	.....	35	50	65	23	8	.....	.....	10	14	8
30	15	.....	31	50	65	23	6	.....	.....	10	14	8
31	101	.....	31	.....	65	.....	6	.....	.....	10	.....	6

NOTE.—Daily discharge for periods of unobstructed channel determined from a discharge rating curve fairly well defined between 4 and 50 second-feet, but uncertain above on account of the lack of high-water measurements during winter floods.

Due allowance has been made for backwater caused by a temporary dam below the gage for the following periods: Apr. 18 to July 20, 1905; Apr. 19 to June 30, 1906; Apr. 17 to July 18, 1909; Apr. 16 to July 6, 1910. The correction curve is defined by the rise in stage when the dam is put in, the fall when it is removed, and by one or two measurements each year.

Corrections have been made for ice during the following periods, using the best data available: Nov. 8 to 13, Dec. 16 to 31, 1905; Jan. 1 to Mar. 20, 1906; Dec. 19 to 31, 1909; Jan. 1 to Feb. 24 and Dec. 19 to 31, 1910.

Discharge estimated July 20 to 31, 1906, Jan. 1 to 11, 1909, and July 7 to Sept. 30, 1910.

Monthly discharge of Bear Creek near Silver Lake, Oreg., for 1905, 1906, 1909, and 1910.

[Drainage area, 77 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Mean per square mile.	Depth in inches on drainage area.	Total in acre-feet.
1905.						
January	.....	.....	a 15.0	0.195	0.22	922
February	50	9	18.4	.239	.25	1,020
March	29	4	9.3	.121	.14	572
April	19	8	10.2	.132	.15	607
May	52	17	28.2	.366	.42	1,730
June	55	27	44.2	.574	.64	2,630
July	27	6	11.0	.143	.16	676
August	6	4	4.6	.060	.07	283
September	4	3.5	3.78	.049	.05	225
October	8	5	6.0	.078	.09	369
November	7	2	4.77	.062	.07	284
December	7	2.5	5.74	.075	.09	353
The year	.....	.....	13.4	.174	2.35	9,670
1906.						
January	.....	.....	a 8.0	.104	.12	492
February	35	4	11.1	.144	.15	616
March	60	4	17.5	.227	.26	1,080
April	33	9	21.9	.284	.32	1,300
May	77	21	42.6	.553	.64	2,620
June	83	33	58.9	.765	.85	3,500
July	65	6	34.5	.448	.52	2,120
The period (212 days)	.....	.....	.....	.....	2.83	11,700
1909.						
January	249	6	44.3	.575	.66	2,720
February	213	4	33.0	.429	.45	1,830
March	31	9	15.4	.200	.23	947
April	40	19	30.7	.399	.45	1,830
May	65	35	51.1	.664	.77	3,140
June	77	40	59.5	.773	.86	3,540
July	35	9	20.9	.271	.31	1,290
August	6	4	4.9	.064	.07	301
September	4	4	4.0	.052	.06	238
October	6	4	4.5	.058	.07	277
November	281	6	34.4	.447	.50	2,050
December	35	9	17.0	.221	.25	1,050
The year	281	4	26.5	.344	4.68	19,200
1910.						
January	129	6	19.6	.255	.29	1,210
February	281	4	43.8	.569	.59	2,430
March	227	31	64.7	.840	.97	3,980
April	60	23	34.9	.453	.51	2,080
May	65	50	61.3	.796	.92	3,770
June	65	23	48.7	.632	.71	2,900
July	35	.....	15.7	.204	.24	965
August	.....	.....	a 4.0	.052	.06	246
September	.....	.....	a 6.0	.078	.09	357
October	10	.....	9.7	.126	.15	596
November	21	10	13.4	.174	.19	797
December	14	6	12.6	.164	.19	775
The year	281	.....	27.8	.361	4.91	20,100

a Estimated.

NOTE.—Values only approximate; some of the monthly means may be 25 per cent or more in error, but the yearly totals are probably considerably more accurate.

MALHEUR AND HARNEY LAKE BASINS.

GENERAL FEATURES.

Malheur and Harney lakes, which are in Harney County, occupy a large basin at a general elevation of 4,100 feet and rimmed by mountain ranges whose elevation is between 5,000 and 7,000 feet. They are connected by a small strait known as The Narrows, through which the water of Malheur flows into Harney Lake. For this reason the water of Malheur Lake is practically fresh, while that of Harney Lake is alkaline. The average rainfall is about 10 inches; on the summit of the divide it is probably about 18 inches or more.

The agricultural lands in this basin comprise nearly 700,000 acres of flat alluvial soil, forming a circular valley surrounding the lakes and extending like fingers into the valleys of tributary streams.

The lower lands are more or less swampy and have for years been utilized as hay flats. During the spring months, when water is abundant, small rock and brush dams sufficiently high to cause the streams to overflow their banks are constructed at convenient points. Much of the meadow lands may thus be covered by a foot or more of running water during five or six weeks of the season. As the stream flow diminishes the swamp and hay lands gradually drain until the middle of July, when they are sufficiently dry to permit the cutting of hay.

Comparatively small areas are cultivated, and on these the crops are limited to rye, oats, and barley. The principal industry of the region has been stock raising, and this has afforded a ready market for all grain and hay that could be raised. During recent years, however, much of the hay lands have been taken as homesteads and the better lands are rapidly being developed.

The principal streams in this basin are Donner und Blitzen River from the south and Silvies River from the north flowing into Malheur Lake; and Silver Creek flowing from the northwest into Harney Lake. South of Silver Creek in a flat valley lies Silver Lake, a small playa which is supplied by overflow from Silver Creek. Donner und Blitzen River, with its principal tributaries Keiger, McCoy, and Mud creeks, drain the western slope of Steins Mountain. This mountain, which is the most prominent topographic feature in the area, is a long timberless ridge, extending northeast and southwest, with a crest length of 60 miles or more. The eastern slope forms an abrupt escarpment; the western slope, which forms a gradual ascent is deeply cut by canyons into which enormous quantities of snow are drifted each year, thus serving as efficient storage reservoirs for winter precipitation. The snows melt gradually and the flow of the streams draining the western slope of the mountain is therefore well maintained throughout the year.

Silvies River drains the northern part of the Malheur-Harney basin, rising in the heart of the Blue Mountains, flowing generally southward through a broken country to Harney Valley, which it traverses in a southeasterly direction, and emptying into swamp lands bordering the northern shores of Malheur Lake. A large part of its drainage area is heavily timbered. The stream is very "flashy," being subject to sudden floods which as suddenly subside. The summer flow is practically nothing.

Silver Creek heads in a spur of the Blue Mountains and flows southeastward through Silver Creek valley into Harney Basin. The upper portion of its drainage area is well timbered, but the lower portion is bare. The stream is subject to sudden floods and in summer its flow practically ceases.

Between Silvies River and Silver Creek and flowing in the same general direction is Sagehen Creek, a small stream heading in a spur of the Blue Mountains and draining a rough, broken country. It empties into the marsh surrounding the northern end of Malheur Lake near the point where Silvies River enters this marsh.

The eastern rim of Harney Valley is broken by a low pass known as Malheur Gap. Through this gap a drainage canal could be excavated that at the deepest portion would not require a cut of more than 18 or 20 feet. This canal would carry the waters of the lakes into Malheur River by way of a tributary of the South Fork. Such a project was at one time begun, but riparian owners of the lake border feared that the absence of these large bodies of water would have an unwholesome effect on the climate of the basin. Accordingly an injunction was issued restraining the company from building the project.

SILVIES RIVER NEAR SILVIES, OREG.

This station, which is located at the proposed dam site about 3 miles southwest of Silvies, Oreg., in sec. 14, T. 19 S., R. 31 E., was established June 16, 1903. Observations were suspended from December 31, 1904, to January 8, 1909, for lack of funds. It is now maintained in cooperation with the Silver Valley Irrigation Co.

An inclined gage is located on the left bank under the cable. The right bank is a berm over which the water flows for 400 feet at an elevation of 5 feet on the gage. The cable spans the entire channel.

At the site of the station a dam can be constructed which will impound all the annual run-off from the drainage area above it. The water so stored could be diverted from the stream for the irrigation of lands in Harney Valley. This project was under investigation at one time by the United States Reclamation Service.

The conditions at the station are not favorable for highly accurate results. The banks of the stream are covered with heavy brush

which serves to create unstable conditions to a certain extent. The bed is sandy, and some changes occur at flood times. During the winter months ice interferes materially with the determination of flow, but due allowance for such conditions has been made, using comparisons with the Burns station, when no other data are available.

Discharge measurements of Silvies River near Silvies, Oreg., for 1908–1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1909.[a]		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 11	R. B. Post	41	104	3.37	58
July 12	.....do	14.5	6.2	2.45	6.8
1910.					
Mar. 26	L. R. Allen	64	368	8.12	699
Oct. 22[b]	R. W. Davenport	14.5	10.1	2.23	4.6

[a] These measurements republished with corrected gage heights on account of error of gage.
[b] Measured by wading, 50 feet above gage.

Daily gage height, in feet, of Silvies River near Silvies, Oreg., for 1909–10.

[David Craddock, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	.....	.....	5.0	4.9	4.8	3.9	2.65	2.25	2.05	2.35	.....	3.05
2	.....	.....	4.8	5.2	4.8	3.8	2.55	2.35	2.15	2.35	.....	2.85
3	.....	4.3	5.0	5.4	4.4	3.8	2.55	2.25	2.15	2.35	2.45	2.95
4	.....	.....	5.3	5.5	4.5	3.7	2.45	2.15	2.15	2.35	2.45	2.95
5	.....	.....	5.4	5.2	4.6	3.8	2.45	2.15	2.25	2.45	2.75	2.95
6	.....	.....	4.5	5.0	4.6	3.8	2.45	2.25	2.15	2.45	2.75	2.85
7	.....	.....	4.4	4.7	4.6	3.7	2.45	2.25	2.15	2.45	2.65	2.85
8	3.2	.....	4.3	4.5	4.7	3.7	2.35	2.25	2.15	2.35	2.45	2.95
9	3.5	.....	3.8	4.7	4.5	3.6	2.35	2.15	2.25	2.35	2.55	2.95
10	.....	4.3	3.9	4.5	4.4	3.5	2.25	2.15	2.25	2.35	2.65	.....
11	.....	.....	3.3	5.1	4.3	3.5	2.35	2.15	2.25	2.45	2.65	2.95
12	.....	.....	4.0	5.1	4.3	3.4	2.45	2.25	2.25	2.45	2.55	2.95
13	.....	.....	3.5	5.2	4.3	3.4	2.45	2.25	2.35	2.45	2.55	3.05
14	.....	.....	3.9	5.4	4.3	3.3	2.45	2.25	2.35	2.45	2.45	2.95
15	3.5	.....	4.3	5.4	4.2	3.3	2.45	2.15	2.35	2.45	2.55	2.95
16	5.7	10.0	4.5	5.4	3.9	3.2	2.45	2.05	2.35	2.45	2.45	2.95
17	6.3	9.3	5.0	5.4	3.9	3.2	2.45	2.05	2.25	2.45	2.45	2.95
18	7.3	7.1	4.7	5.4	3.9	3.3	2.35	2.15	2.25	2.45	2.55	2.95
19	8.5	6.5	4.4	5.3	3.9	3.2	2.35	2.15	2.25	2.45	2.85	2.95
20	9.9	5.9	4.3	5.3	3.9	3.3	2.25	2.15	2.25	2.65	2.65	2.95
21	9.95	5.2	4.1	6.0	3.8	3.3	2.25	2.15	2.35	2.45	.....	2.95
22	8.0	4.7	3.9	4.9	3.7	3.2	2.35	2.05	2.35	2.55	3.0	2.95
23	7.6	4.6	3.9	4.9	3.8	3.1	2.35	2.05	2.25	2.55	3.2	2.95
24	6.4	4.9	4.0	4.8	3.8	3.25	2.25	2.05	2.25	2.55	3.2	2.95
25	5.4	4.4	4.3	4.9	3.7	3.15	2.25	2.05	2.25	2.55	3.2	2.95
26	4.7	4.3	4.5	4.8	3.5	3.15	2.25	2.05	2.25	2.45	3.2	3.05
27	4.5	4.2	4.7	4.9	3.6	3.05	2.35	1.95	2.25	2.55	3.15	3.05
28	.....	4.9	5.1	5.0	3.8	2.95	2.35	2.05	2.35	2.55	2.95	3.05
29	4.3	.....	5.2	5.1	3.9	2.85	2.25	2.05	2.35	2.45	2.95	3.05
30	.....	.....	5.0	4.8	5.1	2.75	2.25	1.95	2.35	2.45	2.95	3.05
31	4.3	.....	4.7	.....	5.0	.....	2.25	1.95	.....	2.45	.....	3.05
1910.												
1	3.05	4.2	10.5	6.3	5.0	2.85	2.15	2.05	.....	2.05	.....	2.85
2	3.05	4.2	10.5	6.4	5.0	2.65	2.15	2.05	.....	2.15	.....	2.9
3	3.05	.....	9.8	6.6	4.8	2.65	2.15	2.05	.....	2.15	.....	2.8
4	.....	.....	8.6	6.5	4.7	2.65	2.15	1.95	.....	2.15	.....	2.8
5	3.05	4.2	7.0	6.6	4.9	2.65	.....	1.95	.....	2.15	2.3	2.7

Daily gage height, in feet, of Silvies River near Silvies, Oreg., for 1909–10—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
6	.....	.....	7.2	6.5	4.8	2.65	.....	1.95	.....	2.25	.....	3.05
7	3.05	.....	6.1	6.6	4.7	2.55	2.15	1.95	.....	2.25	.....	2.8
8	.....	.....	5.6	6.5	4.5	2.55	2.15	1.95	.....	2.25	.....	2.8
9	.....	4.2	5.0	6.4	4.3	2.45	2.15	1.95	.....	2.15	.....	2.8
10	3.05	.....	5.5	6.5	4.3	2.45	2.05	1.95	.....	2.15	.....	2.8
11	.....	4.2	5.2	6.5	3.9	2.45	2.05	1.85	.....	2.15	.....	2.75
12	.....	4.2	5.4	6.7	4.1	2.45	2.05	1.85	Dry.	.....	2.5	2.75
13	3.05	.....	6.2	6.4	3.9	2.45	2.05	1.85	1.85	.....	.....	2.5
14	.....	.....	6.7	6.3	3.9	2.25	.....	1.85	1.95	.....	.....	2.8
15	3.05	4.2	7.2	6.1	3.9	2.25	2.05	1.85	2.05	2.25	.....	2.7
16	.....	.....	7.1	5.9	3.5	2.25	2.05	1.85	2.05	2.25	.....	2.7
17	3.05	4.2	7.2	5.8	3.4	2.25	2.05	1.85	2.05	2.25	.....	2.7
18	.....	.....	7.4	5.6	3.3	2.25	2.05	1.85	2.15	2.25	.....	2.7
19	3.05	4.2	7.8	5.5	3.4	2.25	2.05	1.85	2.15	2.25	2.4	2.6
20	.....	.....	10.0	5.5	3.1	2.25	2.05	.....	2.05	2.25	.....	2.7
21	3.05	.....	10.9	5.5	3.2	2.25	2.05	1.85	2.05	2.25	.....	2.7
22	3.05	4.2	10.1	5.4	3.1	2.25	2.05	Dry.	2.05	2.2	.....	2.7
23	3.55	.....	10.0	5.4	3.0	2.25	2.05	.....	2.05	.....	.....	2.7
24	4.4	4.2	9.9	5.3	3.0	2.25	2.05	.....	2.05	2.3	.....	2.7
25	4.5	4.2	8.9	5.3	2.8	2.15	.....	.....	2.05	.....	2.6	2.75
26	4.6	4.5	8.2	5.1	2.9	2.15	2.15	.....	2.05	.....	.....	.....
27	4.5	4.8	8.0	5.0	3.0	2.15	2.05	.....	2.05	.....	.....	.....
28	4.4	5.2	7.5	4.9	3.1	2.15	2.05	.....	2.15	.....	.....	.....
29	4.3	.....	7.0	4.8	3.1	2.15	2.05	.....	2.15	2.3	.....	.....
30	4.3	.....	6.5	4.9	3.0	2.15	.....	.....	2.05	.....	.....	2.75
31	4.3	.....	6.3	.....	2.9	.....	.....	.....	.....	.....	.....	2.75

NOTE.—Gage heights for 1909 supersede those published in Water-Supply Paper 270, p. 159. In October, 1910, the gage was found to have been raised from its true position, and the evidence indicates that the change occurred prior to the reestablishment of the station in January, 1909.

River reported frozen Jan. 28 to Feb. 15, and Dec. 2–31, 1909.

River frozen over Jan. 1 to Mar. 1, 1910, when the ice began to break; ice gone Mar. 4; a rise caused by a warm spell about Jan. 22 did not take out the ice; water running over the ice Feb. 26 to 28. River frozen Dec. 25 to 31.

Stream bed dry Aug. 22 to Sept. 12, 1910.

Daily discharge, in second-feet, of Silvies River near Silvies, Oreg., for 1909–10.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	6	88	220	208	197	107	14	4.2	2.0	6	8	34
2	8	88	197	242	197	97	10	6	3.0	6	8	22
3	10	88	220	265	157	97	10	4.2	3.0	6	8	28
4	12	88	254	276	167	87	8	3.0	3.0	6	8	28
5	14	88	265	242	177	97	8	3.0	4.2	8	18	28
6	20	88	167	220	177	97	8	4.2	3.0	8	18	22
7	30	88	157	187	177	87	8	4.2	3.0	8	14	22
8	45	88	147	167	187	87	6	4.2	3.0	6	8	28
9	70	88	97	187	167	78	6	3.0	4.2	6	10	28
10	50	88	107	167	157	70	4.2	3.0	4.2	6	14	28
11	30	88	53	231	147	70	6	3.0	4.2	8	14	28
12	20	88	117	231	147	62	8	4.2	4.2	8	10	28
13	30	88	70	242	147	62	8	4.2	6	8	10	34
14	30	88	107	265	147	53	8	4.2	6	8	8	28
15	42	88	147	265	137	53	8	3.0	6	8	10	28
16	179	697	167	265	107	45	8	2.0	6	8	8	28
17	221	882	220	265	107	45	8	2.0	4.2	8	8	28
18	294	465	187	265	107	53	6	3.0	4.2	8	10	28
19	413	393	157	254	107	45	6	3.0	4.2	8	22	28
20	667	322	147	254	107	53	4.2	3.0	4.2	14	14	28
21	684	242	127	334	97	53	4.2	3.0	6	8	22	28
22	359	187	107	208	87	45	6	2.0	6	10	31	28
23	319	177	107	208	97	37	6	2.0	4.2	10	45	28
24	228	208	117	197	97	49	4.2	2.0	4.2	10	45	28
25	159	157	147	208	87	41	4.2	2.0	4.2	10	45	28

Daily discharge, in second-feet, of Silvies River near Silvies, Oreg., for 1909-10—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
26	112	147	167	197	70	41	4.2	2.0	4.2	8	45	34
27	100	137	187	208	78	34	6	1.2	4.2	10	41	34
28	94	208	231	220	97	28	6	2.0	6	10	28	34
29	88	.....	242	231	107	22	4.2	2.0	6	8	28	34
30	88	.....	220	197	231	18	4.2	1.2	6	8	28	34
31	88	.....	187	.....	220	.....	4.2	1.2	.....	8	.....	34
1910.												
1	.....	.....	1,430	369	220	22	3.0	2.0	0	2.0	5	22
2	.....	.....	1,430	381	220	14	3.0	2.0	0	3.0	5	25
3	.....	.....	1,060	405	197	14	3.0	2.0	0	3.0	5	20
4	.....	.....	708	393	187	14	3.0	1.2	0	3.0	5	20
5	.....	.....	453	405	208	14	3.0	1.2	0	3.0	5	16
6	.....	.....	477	393	197	14	3.0	1.2	0	4.2	5	34
7	.....	.....	346	405	187	10	3.0	1.2	0	4.2	6	20
8	.....	.....	288	393	167	10	3.0	1.2	0	4.2	7	20
9	.....	.....	220	381	147	8	3.0	1.2	0	3.0	7	20
10	.....	.....	276	393	147	8	2.0	1.2	0	3.0	8	20
11	.....	.....	242	393	107	8	2.0	.7	0	3.0	9	18
12	.....	.....	265	417	127	8	2.0	.7	0	3.5	9	18
13	.....	.....	358	381	107	8	2.0	.7	.7	3.5	9	9
14	.....	.....	417	369	107	4.2	2.0	.7	1.2	3.5	8	20
15	.....	.....	477	346	107	4.2	2.0	.7	2.0	4.2	8	16
16	.....	.....	465	322	70	4.2	2.0	.7	2.0	4.2	8	16
17	.....	.....	477	311	62	4.2	2.0	.7	2.0	4.2	8	16
18	.....	.....	504	288	53	4.2	2.0	.7	3.0	4.2	7	16
19	.....	.....	563	276	62	4.2	2.0	.7	3.0	4.2	7	12
20	.....	.....	1,160	276	37	4.2	2.0	.7	2.0	4.2	8	16
21	.....	.....	1,650	276	45	4.2	2.0	.7	2.0	4.2	9	16
22	.....	.....	1,210	265	37	4.2	2.0	0	2.0	3.5	9	16
23	.....	.....	1,160	265	31	4.2	2.0	0	2.0	4.2	10	16
24	.....	.....	1,110	254	31	4.2	2.0	0	2.0	5	11	16
25	.....	.....	774	254	20	3.0	2.5	0	2.0	5	12	18
26	.....	130	634	231	25	3.0	3.0	0	2.0	5	14	18
27	.....	160	598	220	31	3.0	2.0	0	2.0	5	15	18
28	.....	200	518	208	37	3.0	2.0	0	3.0	5	17	18
29	.....	.....	453	197	37	3.0	2.0	0	3.0	5	18	18
30	.....	.....	393	208	31	3.0	2.0	0	2.0	5	20	18
31	.....	.....	369	.....	25	.....	2.0	0	.....	5	.....	18

NOTE.—Daily discharge determined from a fairly well-defined discharge rating curve. Values for 1909 supersede those published in Water-Supply Paper 270, page 160 (see note to daily gage heights).

Discharge Jan. 1 to 14, 1909, estimated because of presence of ice. Determinations of discharge Jan. 15 to Feb. 16 were compared with discharge at Burns Station, where there was little ice, and reduced 40 per cent from values derived from open-channel curve.

Mean discharge estimated at 30 second-feet Jan. 1 to Feb. 25, 1910; discharge determined from open-channel curve Feb. 26 to 28 reduced, as ice was still in bottom of river.

No correction Mar. 1 to 4. Determinations may be somewhat too high as ice was present.

Monthly discharge of Silvies River near Silvies, Oreg., for 1909–10.

[Drainage area, 450 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Mean per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1909.							
January	.....	.....	145	0.322	0.37	8,920	D.
February	882	.....	198	.440	.46	11,000	D.
March	265	53	163	.362	.42	10,000	B.
April	334	167	230	.511	.57	13,700	B.
May	231	70	138	.307	.35	8,480	B.
June	107	18	60.4	.134	.15	3,590	B.
July	14	4.2	6.64	.015	.02	408	B.
August	6	1.2	2.94	.0065	.007	181	C.
September	6	2	4.43	.0098	.01	264	B.
October	14	6	8.13	.018	.02	500	B.
November	45	8	19.5	.043	.05	1,160	B.
December	34	22	29	.064	.07	1,780	C.
The year	882	1.2	82.9	.184	2.50	60,000	
1910.							
January	.....	.....	[a] 30	.067	.08	1,840	D.
February	.....	.....	[a] 44.3	.098	.10	2,460	D.
March	1,650	220	661	1.47	1.70	40,600	B.
April	417	197	322	.716	.80	19,200	B.
May	220	20	98.9	.220	.25	6,080	B.
June	22	3	7.21	.016	.02	429	B.
July	3	2	2.34	.0052	.006	144	C.
August	2	0	.71	.0016	.002	44	C.
September	3	0	1.26	.0028	.003	75	C.
October	5	2	3.97	.0088	.01	244	B.
November	20	5	9.1	.020	.02	541	C.
December	34	9	18.2	.040	.05	1,120	C.
The year	1,650	0	101	.224	3.04	72,800	

[a] Estimated.

SILVIES RIVER NEAR BURNS, OREG.

This station, which is located at a wagon bridge near Parker's house, 10 miles upstream from Burns, was established August 14, 1903, but lack of funds caused suspension of observations from July 24, 1906, to December 11, 1908.

The cable from which discharge measurements are made is at Lampshire's ranch, 1 mile above the staff gage, in the NW. ¼ sec. 6, T 22 S., R. 30 E.

The conditions at the cable are not favorable for accurate measurements. The stream flows through a flat, alluvial bottom. The banks are lined with a dense growth of willows and underbrush. The right bank is subject to overflow for about 600 feet. The left bank is high and will not overflow.

The water of Silvies River is used largely for the flood irrigation of hay lands in Harney Valley. As even the flood discharge of the stream is used for this purpose, the development of an irrigation project that would contemplate the diversion of the water would involve the settlement of accrued water rights.

Discharge measurements of Silvies River near Burns, Oreg., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 29	L. R. Allen	73	637	12.72	943
Oct. 17 [a]	R. W. Davenport	35	21	2.64	19.6
Dec. 12 [a]	do	39	30	2.87	48

[a] Waded 10 feet below gage.

Daily gage height, in feet, of Silvies River near Burns, Oreg., for 1910.

[Mrs. Leona Parker, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.65	3.05	6.85	11.2	6.2	2.65	2.5	2.35	2.35	2.55	2.65	2.85
2	2.65	3.05	12.25	11.2	6.2	2.65	2.5	2.35	2.35	2.55	2.65	2.85
3	2.65	3.05	14.9	11.2	6.2	2.65	2.5	2.35	2.35	2.55	2.65	2.85
4	2.65	3.0	15.1	11.2	6.2	2.65	2.5	2.35	2.35	2.55	2.65	2.85
5	2.65	3.0	14.55	11.2	6.1	2.65	2.5	2.35	2.35	2.55	2.65	2.85
6	2.65	3.0	13.9	10.9	6.1	2.65	2.5	2.35	2.35	2.55	2.65	2.9
7	2.7	3.0	13.0	10.9	6.1	2.65	2.5	2.35	2.35	2.55	2.65	2.9
8	2.7	3.05	11.7	11.1	5.6	2.65	2.5	2.3	2.35	2.55	2.75	2.9
9	2.75	3.05	11.8	11.1	5.1	2.65	2.5	2.3	2.35	2.55	2.75	2.9
10	2.75	3.05	11.6	11.2	5.0	2.65	2.45	2.3	2.35	2.55	2.75	2.9
11	2.75	3.05	11.6	11.3	4.8	2.65	2.45	2.3	2.45	2.55	2.75	2.9
12	2.75	3.0	11.6	11.2	4.7	2.65	2.45	2.3	2.45	2.55	2.75	2.9
13	2.75	3.0	12.15	10.9	4.5	2.65	2.45	2.3	2.45	2.55	2.75	.....
14	2.75	3.0	12.6	10.9	4.5	2.65	2.45	2.35	2.55	2.55	2.75	.....
15	2.75	3.0	13.4	10.4	4.2	2.65	2.4	2.35	2.55	2.55	2.7	.....
16	2.85	3.0	13.6	9.9	4.1	2.65	2.4	2.35	2.55	2.65	2.7	.....
17	2.85	3.0	14.2	9.5	3.9	2.6	2.4	2.35	2.55	2.65	2.7	.....
18	2.8	3.0	14.25	9.3	3.7	2.6	2.4	2.35	2.55	2.65	2.75	.....
19	2.9	3.0	14.7	9.0	3.2	2.55	2.4	2.35	2.55	2.65	2.75	.....
20	2.9	3.0	15.7	8.6	3.0	2.55	2.4	2.35	2.55	2.65	2.75	2.8
21	2.95	3.0	15.7	8.0	3.05	2.55	2.4	2.35	2.55	2.65	2.8	2.7
22	2.95	3.0	15.7	7.9	3.05	2.55	2.4	2.35	2.55	2.65	2.8	2.65
23	2.95	3.0	15.3	7.6	3.05	2.55	2.4	2.35	2.55	2.65	2.8	2.65
24	2.95	3.0	14.9	7.3	3.0	2.55	2.35	2.35	2.55	2.65	2.8	2.65
25	2.95	3.0	14.7	7.0	3.0	2.55	2.35	2.35	2.55	2.65	2.8	2.6
26	2.95	3.0	14.5	6.9	3.0	2.55	2.35	2.35	2.55	2.65	2.8	2.6
27	2.9	3.1	13.9	6.8	2.95	2.5	2.35	2.35	2.55	2.65	2.8	2.6
28	2.9	3.4	13.6	6.6	2.95	2.5	2.35	2.35	2.55	2.65	2.8	2.6
29	2.9	.....	12.8	6.5	2.85	2.5	2.35	2.35	2.55	2.65	2.85	2.6
30	3.05	.....	11.8	6.3	2.65	2.5	2.35	2.35	2.55	2.65	2.85	2.6
31	3.2	.....	11.6	.....	2.65	.....	2.35	2.35	.....	2.65	.....	2.6

NOTE.—No ice reported by observer; river probably somewhat obstructed by ice from about Jan. 30 to Feb. 26.

Gage readings Dec. 13 to 19 were questionable and have been discarded.

Daily discharge, in second-feet, of Silvies River near Burns, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	21	.....	382	803	327	21	11	6	6	14	21	40
2	21	.....	937	803	327	21	11	6	6	14	21	40
3	21	.....	2,170	803	327	21	11	6	6	14	21	40
4	21	.....	2,390	803	327	21	11	6	6	14	21	40
5	21	.....	1,810	803	319	21	11	6	6	14	21	40
6	21	.....	1,340	768	319	21	11	6	6	14	21	45
7	25	.....	1,080	768	319	21	11	6	6	14	21	45
8	25	.....	863	791	278	21	11	4	6	14	30	45
9	30	.....	875	791	237	21	11	4	6	14	30	45
10	30	.....	851	803	229	21	9	4	6	14	30	45
11	30	.....	851	815	213	21	9	4	9	14	30	45
12	30	.....	851	803	205	21	9	4	9	14	30	45
13	30	.....	922	768	189	21	9	4	9	14	30	45
14	30	.....	1,000	768	189	21	9	6	14	14	30	45
15	30	.....	1,170	713	163	21	7	6	14	14	25	40
16	40	.....	1,230	660	154	21	7	6	14	21	25	40
17	40	.....	1,520	620	136	17	7	6	14	21	25	40
18	35	.....	1,560	601	119	17	7	6	14	21	30	35
19	45	.....	1,960	574	73	14	7	6	14	21	30	35
20	45	.....	3,050	538	54	14	7	6	14	21	30	35
21	50	.....	3,050	484	59	14	7	6	14	21	35	25
22	50	.....	3,050	475	59	14	7	6	14	21	35	21
23	50	.....	2,610	448	59	14	7	6	14	21	35	21
24	50	.....	2,170	421	54	14	6	6	14	21	35	21
25	50	.....	1,960	394	54	14	6	6	14	21	35	17
26	50	.....	1,760	386	54	14	6	6	14	21	35	17
27	45	64	1,340	377	50	11	6	6	14	21	35	17
28	45	92	1,230	361	50	11	6	6	14	21	35	17
29	45	.....	1,040	352	40	11	6	6	14	21	40	17
30	.....	.....	875	336	21	11	6	6	14	21	40	17
31	.....	.....	851	.....	21	.....	6	6	.....	21	.....	17

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined between 15 and 2,800 second-feet. Mean discharge Jan. 30 to Feb. 26 estimated at 40 second-feet. Discharge Dec. 13 to 19 interpolated.

Monthly discharge of Silvies River near Burns, Oreg., for 1910.

[Drainage area, 865 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Mean per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	50	21	35.7	0.041	0.05	2,200	D.
February	92	40	42.7	.049	.05	2,370	D.
March	3,050	382	1,510	1.75	2.02	92,800	B.
April	815	336	628	.726	.81	37,400	B.
May	327	21	162	.187	.22	9,960	B.
June	21	11	17.5	.020	.02	1,040	B.
July	11	6	8.2	.0095	.01	504	C.
August	6	4	5.6	.0065	.007	344	C.
September	14	6	10.8	.012	.01	643	C.
October	21	14	17.6	.020	.02	1,080	B.
November	40	21	29.4	.034	.04	1,750	B.
December	45	17	33.4	.039	.04	2,050	C.
The year	3,050	4	210	.243	3.30	152,000	

DONNER UND BLITZEN RIVER NEAR DIAMOND, OREG.

The water of Donner und Blitzen River is used to irrigate hay lands in the Donner und Blitzen swamp, which embraces nearly 100,000 acres of land extending from the P ranch to Narrows. The ranch is owned by the William Hanley Co., which has cooperated by observations of gage heights.

The gaging station, which is located at the mouth of the canyon in sec. 20, T. 32 S., R. 32½ E., above all irrigation ditches, was established Jan. 27, 1909, at a private wagon bridge near the P ranch buildings, 25 miles southwest of Diamond and near the point where the river enters the swamp. The station was removed to the present site, 2 miles farther upstream, May 23, 1910.

The gage at the original site was a vertical staff fastened to the right bank just below the bridge from which discharge measurements were made. Five irrigation ditches divert water from the stream above the bridge, and a brush and rock dam about 300 feet below the bridge is used to divert water into another ditch. When water is to be diverted the dams are repaired and raised by adding more rock and brush. Two of these ditches run water during the entire year, three of them only during the irrigation season. No record has been kept of the actual time of operation. The flow at this point is considerably less than the natural flow of the stream, particularly during the irrigation season.

From a point near the mouth of the canyon, 5 miles above the P ranch, the banks of the stream are subject to overflow during times of flood. They are covered with a dense growth of willows and underbrush, and it is almost impossible to find a place where the stream can be measured in a single channel even at moderate stages.

At the upper station, discharge measurements are made from a cable and conditions are fairly good for obtaining accurate results. There is considerable daily fluctuation on this river during the spring, and the water from the snow melting in the daytime may pass the station at night when no record can be obtained.

The upper gage was read occasionally during the summer of 1910. By computing the discharge for the days on which the gage was read and subtracting the discharge at the lower station on these days, the net diversion above the old station is determined. These diversions are thus found to vary from 118 second-feet on June 19 to 13 second-feet on October 4. The amount diverted has been estimated for each month and added to the determined discharge at the lower station, thus affording an approximate estimate of the total run-off.

A diversion dam below the old station caused backwater at the lower gage during the summer of 1910. As no discharge measurements were made between June and December, 1909, the influence of

the dam during that year is uncertain, but the low-water estimates based on gage heights for that period (published in Water-Supply Paper 270, p. 165) were probably rendered somewhat too large. The summer discharge for 1910 has, therefore, been estimated from observations in 1911, when continuous records were obtained at the upper station.

Discharge measurements of Donner und Blitzen River near Diamond, Oreg., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
	LOWER GAGE.	*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 21	Stevens and Allen	35	96	3.50	195
Oct. 4	Allen and Davenport	32	48	2.10	39
	UPPER GAGE.				
May 22	Stevens and Allen	55	101	3.51	334
Oct. 4[a]	Allen and Davenport	25	21	2.61	49

[a] Measured by wading.

Daily gage height, in feet, of Donner und Blitzen River near Diamond, Oreg., for 1910.

[Lower gage. J. P. Jefferson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.68	2.80	4.85	4.40	.....	3.90	2.08	.....	.....	.....	1.56
2	1.72	2.70	5.60	3.85	.....	3.92	2.00	.....	.....	.....	1.62
3	1.62	2.92	5.30	4.05	.....	3.52	2.05	.....	.....	.....	1.68
4	1.60	2.70	4.35	4.60	3.60	3.10	1.96	.....	.....	.....	1.68
5	1.88	2.60	4.22	4.70	3.25	3.00	1.90	.....	.....	.....	1.52
6	1.68	2.60	4.05	4.55	3.45	3.15	1.92	.....	.....	.....	1.50
7	1.62	2.78	3.50	4.20	3.35	2.80	1.98	.....	.....	.....	1.58
8	1.52	3.02	4.15	4.12	3.35	2.30	1.68	.....	.....	.....	1.58
9	1.48	2.90	3.95	4.10	4.05	2.50	1.75	.....	.....	.....	1.55
10	1.60	2.68	3.45	4.25	4.20	2.60	1.78	.....	.....	.....	1.48
11	2.02	2.75	3.55	4.20	4.15	2.70	1.78	.....	.....	.....	1.52
12	1.52	2.88	3.75	4.50	4.15	2.65	1.82	.....	.....	.....	1.55
13	1.42	2.90	3.90	4.48	4.25	2.51	1.80	.....	.....	.....	.....
14	1.40	2.75	4.30	4.55	3.95	2.42	1.80	.....	.....	.....	.....
15	1.35	2.58	4.25	4.30	4.15	2.48	1.78	.....	.....	.....	.....
16	1.32	2.15	4.40	4.05	3.90	2.56	1.82	.....	.....	.....	.....
17	1.50	1.72	4.35	4.10	3.65	2.48	1.68	.....	.....	.....	.....
18	1.42	1.58	4.50	4.22	3.85	2.38	1.70	.....	.....	.....	.....
19	1.32	1.42	5.00	4.35	3.95	2.15	1.74	.....	.....	.....	.....
20	1.42	1.35	5.65	4.05	3.65	2.20	1.75	.....	.....	.....	.....
21	1.45	1.38	5.40	4.30	3.60	2.12	1.82	.....	.....	.....	.....
22	3.45	1.48	5.00	4.20	3.70	2.05	1.70	.....	.....	.....	.....
23	5.70	1.42	5.05	4.30	3.98	2.05	1.68	.....	.....	.....	.....
24	3.05	2.10	4.45	4.65	4.05	2.00	1.65	.....	.....	.....	.....
25	2.65	2.28	4.40	5.15	3.92	2.11	1.62	.....	.....	.....	.....
26	2.52	2.02	4.30	5.40	3.65	2.05	1.59	.....	.....	.....	.....
27	2.52	2.15	4.25	5.00	3.75	2.06	1.60	.....	.....	.....	.....
28	2.40	3.75	4.15	4.20	3.75	2.22	1.62	.....	.....	.....	.....
29	2.38	.....	4.05	.....	3.68	2.10	1.59	.....	.....	.....	.....
30	2.62	.....	4.15	.....	3.82	1.98	1.58	.....	.....	.....	.....
31	2.42	.....	4.15	.....	3.86	.....	.....	.....	.....	.....	.....

NOTE.—Gage heights from about Jan. 24 to Feb. 7 increased by effect of a driftwood jam on a riffle below. A dam about a mile below the gage, used to divert water into a canal, was raised prior to the measurement on May 21, probably some time in March or April; it had evidently been lowered prior to the November readings and seem to have remained stable.

Relation of gage height to discharge probably not affected by ice.

Daily discharge, in second-feet, of Donner und Blitzen River near Diamond, Oreg., for 1910

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	62	64	510	338	258	257	37
2	66	56	637	249	242	260	32
3	58	94	586	281	226	198	35
4	56	82	425	372	210	141	30
5	80	64	404	389	160	129	27
6	62	64	377	364	188	148	28
7	58	80	289	305	174	106	31
8	50	217	393	292	174	53	17
9	48	200	361	289	281	73	20
10	56	169	282	313	305	84	21
11	94	179	297	305	297	95	21
12	50	197	329	355	297	91	23
13	43	200	353	352	313	74	22
14	42	179	417	364	265	64	22
15	38	156	409	321	297	71	21
16	36	107	433	281	257	80	23
17	49	66	425	289	218	71	17
18	43	55	450	308	249	60	18
19	36	43	535	330	265	42	20
20	43	38	646	281	218	45	20
21	46	41	513	321	210	39	23
22	282	48	441	305	225	35	18
23	654	43	450	321	270	35	17
24	97	102	346	380	281	32	16
25	68	121	338	468	260	39	16
26	58	94	321	513	218	35	15
27	58	107	313	441	233	36	15
28	49	329	297	305	233	46	16
29	48	.....	281	290	222	38	15
30	66	.....	297	274	244	31	14
31	50	.....	297	.....	251	.....	14

NOTE.—Daily discharge Jan. 1 to Mar. 20 determined from a discharge rating curve fairly well defined by measurements in 1909. Discharge Mar. 21 to July 30 determined from a poorly defined curve. The change between this curve and the previous one was caused by a diversion dam; the stability of this dam and the exact period of its operation are uncertain.

Daily discharge for November can not be computed. Determinations reduced arbitrarily Jan 24 to Feb. 7 to allow for effect of wood jam. Values show only unappropriated flow at this point and are somewhat less than the total flow of the river.

Monthly discharge of Donner und Blitzen River near Diamond, Oreg., for 1910.

[Lower gage.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	654	36	82.1	5,050	C.
February	329	38	114	6,330	C.
March	646	281	402	24,700	B.
April	513	249	333	19,800	C.
May	313	160	243	14,900	B.
June	260	31	83.6	4,980	B.
July	37	14	21.4	1,320	B.
The period				77,100	

Daily gage height, in feet, and discharge, in second-feet, of Donner und Blitzen River near Diamond, Oreg., for 1910.

[Upper gage.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Feet.*		*Feet.*	*Feet.*
May 22	3.51	292	July 3	2.90	106
29	3.42	261	10	2.75	75
June 5	3.32	228	16	2.65	58
12	3.10	160	24	2.60	50
19	3.10	160	Oct. 4	2.61	52
26	2.92	111	Nov. 6	2.60	50

NOTE.—Daily discharge determined from a discharge rating curve well defined by measurements, most of which were made in 1911. They represent the total flow of the river.

Monthly discharge of Donner und Blitzen River near Diamond, Oreg., for 1909–10.

[Drainage area, 238 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Lower station.	Canals.	Total.	Mean per square mile.	Depth in inches on drainage area.	Total in acre-feet.
1909.						
January			[a] 80.0	0.336	0.39	4,920
February	63.9	10	73.9	.310	.32	4,100
March	105	10	115	.483	.56	7,070
April	155	30	185	.777	.87	11,000
May	185	60	145	.609	.70	8,920
June	298	90	388	1.63	1.82	23,100
July			[a] 95	.399	.46	5,840
August			[a] 41	.172	.20	2,520
September			[a] 40	.168	.19	2,380
October	47.1	15	62.1	.261	.30	3,820
November	92.7	10	103	.433	.48	6,130
December	66.8	10	76.8	.322	.37	4,720
The year			117	.492	6.66	84,500
1910.						
January	82.1	10	92.1	.387	.45	5,660
February	114	10	124	.521	.54	6,890
March	402	10	412	1.73	1.99	25,300
April	333	30	363	1.53	1.71	21,600
May	243	60	303	1.27	1.46	18,600
June	82.7	90	173	.727	.81	10,300
July	21.3	50	71.3	.300	.35	4,380
August			[a] 41	.172	.20	2,520
September			[a] 40	.168	.19	2,380
October			[a] 50	.210	.24	3,070
November			[a] 50	.210	.23	2,980
December			[a] 60	.252	.29	3,690
The year			148	.623	8.46	107,000

[a] Estimated.

NOTE.—Monthly discharge computed by adding the estimated diversion of the canal to the discharge determined from observation at the lower station. Discharge for January and July to September, 1909, and August to December, 1910, estimated by comparison with records derived from observations at other stations and by assuming that the low-water discharge in 1911 was fairly representative of that in previous years. Figures published for the lower station for July to September, 1909, have been discarded as probably too high, for the channel was obstructed during that period.

The figures for each month are liable to considerable error, but they afford a basis for an approximate estimate of the total yearly discharge.

KEIGER CREEK NEAR DIAMOND, OREG.

The waters of Keiger Creek are used to irrigate hay land in the Diamond swamp.

The gaging station, which is located 3 miles south of Diamond post office, in sec. 10, T. 30 S., R. 33 E., above all present irrigation ditches, was established January 26, 1909. Observation of gage heights was suspended May 31, 1910, as the observer moved away.

The gage is a vertical staff on the right bank.

Discharge measurements are made by wading at any convenient point near the gage. No facilities have been provided for making measurements at high stages.

The stream flows through an alluvial bottom on a flat grade. The banks are subject to overflow and are covered with a dense growth of willows and underbrush, which trail in the water, catch débris, and form obstructions that produce unstable conditions at the gage. For this reason the results do not possess a high degree of accuracy, but they suffice for a general study of the behavior of the stream.

The following discharge measurement was made by Stevens and Allen by wading above the gage:

May 23, 1910: Width, 20 feet; area, 32 square feet; gage height, 1.67 feet; discharge, 54 second-feet.

Daily gage height, in feet, of Keiger Creek near Diamond, Oreg., for 1910.

[H. D. Pugsley, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Jan.	Feb.	Mar.	Apr.	May.
1	0.9	1.0	2.0	1.8	1.9	16	0.6	0.5	1.7	1.9	2.0
2	.8	1.0	1.6	1.8	1.8	17	.5	.6	1.8	1.9	1.8
3	.8	1.0	1.4	1.8	1.75	18	.5	.7	1.8	1.9	1.8
4	.8	.5	2.0	1.8	1.75	19	.6	.8	2.0	2.1	1.8
5	.9	1.5	1.6	1.75	1.8	20	.6	.8	2.1	2.2	1.75
6	.9	1.0	1.5	1.75	1.9	21	.8	.8	2.0	2.3	1.7
7	.9	.75	1.5	1.75	2.0	22	2.0	.8	1.9	2.4	1.8
8	.9	.5	1.5	1.8	2.1	23	2.0	1.0	1.9	2.6	1.8
9	.9	.6	1.6	1.8	2.3	24	1.0	1.2	1.8	2.75	1.8
10	.9	.6	1.55	1.8	2.4	25	.9	2.0	1.8	2.8	2.1
11	.9	.6	1.5	1.9	2.1	26	.8	1.9	2.0	3.3	2.1
12	.8	.65	1.7	1.9	2.0	27	.8	2.0	1.9	3.2	2.15
13	.8	.65	1.7	2.0	2.1	28	.8	2.0	1.9	2.8	2.3
14	.75	.6	1.6	2.0	2.1	29	.8	.....	1.8	2.3	2.5
15	.7	.6	1.6	2.0	2.0	30	1.5	.....	1.8	2.0	2.6
						31	1.5	.....	1.8	.....	2.7

NOTE.—Relation between gage height and discharge at this station is probably little or not at all affected by ice.

Daily discharge, in second-feet, of Keiger Creek near Diamond, Oreg., for 1909–10.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.											
1	26	16	47	96	215	81	14	9.2	10	12	19
2	24	16	47	104	239	62	13	12	10	12	18
3	19	16	62	140	251	52	12	14	12	12	18
4	14	16	57	150	251	47	12	12	14	12	18
5	13	16	47	150	245	43	12	10	14	13	47
6	24	18	57	150	245	35	12	14	14	14	47
7	19	19	43	150	181	32	12	10	14	12	43
8	19	19	47	150	181	32	12	10	12	12	52
9	13	12	47	150	176	32	12	12	12	14	57
10	22	10	62	160	160	35	12	9.2	12	14	24
11	20	14	60	140	160	34	12	9.2	12	14	19
12	14	14	47	140	131	32	11	10	10	14	43
13	14	18	68	131	140	30	11	12	10	14	18
14	12	20	74	122	150	29	10	9.2	10	14	18
15	12	18	88	113	150	29	10	10	10	16	16
16	19	18	122	104	150	29	10	10	10	16	16
17	30	26	113	108	140	29	10	9.2	10	16	43
18	24	26	113	104	140	28	9.2	8.2	10	20	29
19	23	24	113	108	140	26	9.2	8.5	9.2	22	29
20	18	24	104	122	122	26	9.2	9.2	10	26	29
21	18	26	104	113	122	26	9.2	9.2	10	43	29
22	39	26	96	108	140	25	9.2	9.2	12	43	29
23	22	24	104	104	122	24	9.2	9.2	11	43	29
24	14	113	96	108	113	18	9.2	9.2	12	43	24
25	14	44	113	113	104	18	9.2	9.2	12	43	26
26	13	39	140	113	104	19	9.2	9.2	12	39	26
27	10	43	140	131	81	19	9.2	9.2	12	35	26
28	16	35	140	131	74	18	9.2	9.2	12	26	26
29	.....	35	131	122	74	18	9.2	10	12	20	28
30	.....	35	96	181	74	18	9.0	10	12	20	29
31	.....	39	.....	203	.....	18	9.0	.....	12	.....	29

Day.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Jan.	Feb.	Mar.	Apr.	May.
1910.						1910.					
1	26	29	74	62	68	16	20	18	57	68	74
2	24	29	52	62	62	17	18	20	62	68	62
3	24	29	43	62	60	18	18	22	62	68	62
4	24	18	74	62	60	19	20	24	74	81	62
5	26	47	52	60	62	20	20	24	81	88	60
6	26	29	47	60	68	21	24	24	74	96	57
7	26	23	47	60	74	22	74	24	68	104	62
8	26	18	47	62	81	23	74	29	68	122	62
9	26	20	52	62	96	24	29	35	62	136	62
10	26	20	50	62	104	25	26	74	62	140	81
11	26	20	47	68	81	26	24	68	74	192	81
12	24	21	57	68	74	27	24	74	68	181	84
13	24	21	57	74	81	28	24	74	68	140	96
14	23	20	52	74	81	29	24	.....	62	96	113
15	22	20	52	74	74	30	47	.....	62	74	122
						31	47	.....	62	.....	131

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined between 10 and 120 second-feet, but very uncertain above. Determination for the winter period somewhat uncertain, as ice affected to a slight degree the relation of gage height to discharge.

Monthly discharge of Keiger Creek near Diamond, Oreg., for 1909–10.

[Drainage area, 50 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Mean per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1909.							
February	39	10	18.8	0.376	0.39	1,040	C.
March	113	10	26.4	.528	.61	1,620	B.
April	140	43	82.2	1.64	1.83	4,890	B.
May	203	96	130	2.60	3.00	7,990	C.
June	251	74	152	3.04	3.39	9,040	C.
July	81	18	31.1	.622	.72	1,910	B.
August	.14	9	10.5	.210	.24	646	B.
September	14	8.2	10.0	.200	.22	595	B.
October	14	9.2	11.4	.228	.26	701	B.
November	43	12	21.8	.436	.49	1,300	B.
December	57	16	29.2	.584	.67	1,800	
The period						31,500	
1910.							
January	74	18	28.6	0.572	0.66	1,760	C.
February	74	18	31.2	.624	.65	1,730	B.
March	81	43	60.3	1.21	1.40	3,710	B.
April	192	60	87.5	1.75	1.95	5,210	B.
May	131	57	77.7	1.55	1.79	4,780	B.
The period						17,200	

McCOY CREEK NEAR DIAMOND, OREG.

This station, which is located at Kesterson's ranch, in sec. 12, T. 30 S., R. 32 E., and above all present irrigation ditches, was established January 27, 1909, at a point three-fourths of a mile west of Diamond ranch house and 3 miles from Diamond post office, and was removed to the present site, 2½ miles above the old one, on May 23, 1910, observations at the original site having been suspended June 30, 1909, for lack of an observer.

Several irrigation ditches divert water above the original station for hay lands in the Diamond swamp, but no estimate has been made of the flow of these ditches, and the results obtained during 1909 do not represent the natural flow of the stream. The figures published for that year, therefore, are only of general interest and do not possess a high degree of accuracy.

At the new station conditions are favorable for good results. Discharge measurements are made by wading or from a footbridge 25 yards above the vertical staff gage.

Discharge measurements of McCoy Creek near Diamond, Oreg., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 23	Stevens and Allen	25	37	3.64	80
Oct. 7	R. W. Davenport	11.5	4	1.79	3.6

Daily gage height, in feet, of McCoy Creek near Diamond, Oreg., for 1910.

[Mrs. Grant Kesterson, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.4	2.0	1.65	1.6	1.8	.....	1.85
2	.....	3.3	1.95	1.65	1.6	1.8	1.8	1.85
3	.....	2.8	1.95	1.65	1.6	1.85	1.8	1.85
4	.....	2.8	2.0	1.65	1.6	1.9	1.8	1.85
5	.....	2.8	1.95	1.65	1.6	1.85	1.8	1.85
6	.....	2.8	1.95	1.65	1.6	1.85	1.8	1.85
7	.....	2.8	1.95	1.65	1.6	1.8	1.8	1.85
8	.....	2.7	1.9	1.65	1.6	1.8	1.85	1.85
9	.....	2.5	1.9	1.6	1.6	1.8	1.9	2.0
10	.....	2.5	1.8	1.6	1.6	1.8	1.85	2.0
11	.....	2.5	1.8	1.6	1.6	1.8	1.9	2.1
12	.....	2.45	1.8	1.6	1.6	1.8	1.95	2.1
13	.....	2.4	1.8	1.6	1.7	1.8	1.95	1.9
14	.....	2.4	1.8	1.6	1.7	1.8	1.9	1.9
15	.....	2.4	1.8	1.6	1.7	1.85	1.9	1.9
16	.....	2.4	1.8	1.6	1.8	1.85	1.85	2.0
17	.....	2.4	1.8	1.6	1.8	1.85	1.85	1.9
18	.....	2.4	1.8	1.6	1.75	1.85	1.9	1.9
19	.....	2.4	1.8	1.6	1.7	1.9	1.85	2.0
20	.....	2.3	1.8	1.6	1.7	1.85	1.8	2.0
21	.....	2.2	1.9	1.6	1.7	1.8	1.9	2.0
22	.....	2.2	1.8	1.6	1.7	1.8	2.0	1.9
23	3.65	2.15	1.75	1.6	1.7	1.8	1.95	1.85
24	.....	2.15	1.75	1.6	1.7	1.8	2.0	.....
25	.....	2.1	1.7	1.6	1.7	1.8	2.0	.....
26	.....	2.1	1.7	1.6	.....	1.8	.....	1.8
27	.....	2.05	1.7	1.6	.....	.....	1.95	1.8
28	3.45	2.05	1.7	1.6	.....	.....	2.0	1.8
29	3.2	2.0	1.7	1.6	.....	.....	1.95	1.85
30	3.6	2.0	1.7	1.6	.....	.....	1.9	1.85
31	3.6	.....	1.65	1.6	.....	.....	.....	1.85

NOTE.—No ice reported in December.

Daily discharge, in second-feet, of McCoy Creek near Diamond, Oreg., for 1910.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	65	7	1.5	1.0	3.5	3.5	4.2
2	.....	59	6	1.5	1.0	3.5	3.5	4.2
3	.....	33	6	1.5	1.0	4.2	3.5	4.2
4	.....	33	7	1.5	1.0	5	3.5	4.2
5	.....	33	6	1.5	1.0	4.2	3.5	4.2
6	.....	33	6	1.5	1.0	4.2	3.5	4.2
7	.....	33	6	1.5	1.0	3.5	3.5	4.2
8	.....	29	5	1.5	1.0	3.5	4.2	4.2
9	.....	21	5	1.0	1.0	3.5	5	7
10	.....	21	3.5	1.0	1.0	3.5	4.2	7
11	.....	21	3.5	1.0	1.0	3.5	5	9
12	.....	20	3.5	1.0	1.0	3.5	6	9
13	.....	18	3.5	1.0	2.0	3.5	6	5
14	.....	18	3.5	1.0	2.0	3.5	5	5
15	.....	18	3.5	1.0	2.0	4.2	5	5
16	.....	18	3.5	1.0	3.5	4.2	4.2	7
17	.....	18	3.5	1.0	3.5	4.2	4.2	5
18	.....	18	3.5	1.0	2.8	4.2	5	5
19	.....	18	3.5	1.0	2.0	5.0	4.2	7
20	.....	15	3.5	1.0	2.0	4.2	3.5	7
21	.....	12	5	1.0	2.0	3.5	5	7
22	.....	12	3.5	1.0	2.0	3.5	7	5
23	80	10	2.8	1.0	2.0	3.5	6	4.2
24	78	10	2.8	1.0	2.0	3.5	7	4.2
25	75	9	2.0	1.0	2.0	3.5	7	3.5
26	72	9	2.0	1.0	2.0	3.5	6	3.5
27	70	8	2.0	1.0	2.8	3.5	6	3.5
28	68	8	2.0	1.0	2.8	3.5	7	3.5
29	53	7	2.0	1.0	2.8	3.5	6	4.2
30	77	7	2.0	1.0	3.5	3.5	5	4.2
31	77	.....	1.5	1.0	.....	3.5	.....	4.2

NOTE.—Daily discharge determined from a fairly well-defined discharge rating curve. Discharge May 24 to 27 interpolated.

Monthly discharge of McCoy Creek near Diamond, Oreg., for 1910.

[Drainage area, 56 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
May 23–31	80	53	72.2	1.29	0.43	1,290	B.
June	65	7	21.1	.376	.42	1,260	B.
July	7	1.5	3.87	.069	.08	238	B.
August	1.5	1.0	1.13	.020	.02	69	B.
September	3.5	1.0	1.86	.033	.04	111	B.
October	5	3.5	3.78	.068	.08	232	B.
November	7	3.5	4.93	.088	.10	293	B.
December	9	3.5	5.12	.091	.10	315	B.
The period						3,810	

SILVER CREEK NEAR RILEY, OREG.

This station, which is located about 200 feet above the bridges across the Silver Creek on Cecil's ranch, about 12 miles north of Riley, Oreg., on the main stage road from Prineville to Burns, was established April 19, 1904. Observations were suspended from July 14, 1906, to January 14, 1909, and from December 13, 1909, to April 6, 1910. The station is now maintained in cooperation with the Silver Valley Irrigation Co.

When the station was reestablished January 14, 1909, it was practically impossible to install a permanent gage; temporary gages have therefore been used, all referring to the same datum except the one read during December, 1910.

Discharge measurements are made from a cable installed in January, 1909.

One hundred feet below the cable is a brush and rock dam which diverts water into three channels. Stable relations between discharge and gage heights can be established only during the irrigating seasons and the time between first fall flood, when the dam is washed out, and the spring when it is reconstructed. Usually only the brush, earth, and smaller stones are washed away. For this reason results at this station will be only approximate, but it is the only site that can be utilized that is within practical distance of an observer.

The waters of Silver Creek are now largely used for the irrigation of hay lands in Silver Creek valley. The Silver Creek reservoir site, which was investigated by the Reclamation Service, and later by the Silver Valley Irrigation Co., is 3 or 4 miles above the station. At this point a large quantity of water can be stored. Below the station on both sides of the stream are large areas of agricultural land which could be irrigated from stored water.

Discharge measurements of Silver Creek near Riley, Oreg., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 6	L. R. Allen	63	257	3.89	191
May 29	Stevens and Allen	16	13	1.52	14
Oct. 19	R. W. Davenport	20	5	1.25	2.4
Dec. 9	....do	13	4	[a] 1.16	6.1

[a] Silver Valley Irrigation Co. gage read 0.50. Some ice at old gage.

Daily gage height, in feet, of Silver Creek near Riley, Oreg., for 1910.

[Mrs. W. C. Cecil, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Dec.	Day.	Apr.	May.	June.	July.	Aug.	Dec.
1	.....	2.0	1.4	1.0	0.2	0.45	16	2.9	1.8	1.2	0.5	.....	0.5
2	.....	2.0	1.4	.9	.1	.5	17	2.8	1.8	1.1	.6	.....	.45
3	.....	2.1	1.4	.9	.....	.5	18	2.7	1.8	1.1	.6	.....	.4
4	.....	2.2	1.3	.9	.....	.45	19	2.6	1.7	1.2	.5	.....	.....
5	.....	2.1	1.3	.9	.....	.4	20	2.4	1.8	1.2	.5	.....	.....
6	3.9	2.0	1.3	.9	.....	.5	21	2.3	1.8	1.2	.4	.....	.....
7	.....	1.9	1.3	.9	.....	.5	22	2.2	1.7	1.2	.4	.....	.....
8	3.6	1.9	1.3	.9	.....	.5	23	2.4	1.7	1.2	.4	.....	.....
9	3.6	1.8	1.3	.9	.....	.5	24	2.3	1.5	1.1	.4	.....	.....
10	3.6	2.0	1.3	.8	.....	.5	25	2.2	1.5	1.1	.4	.....	.....
11	3.5	2.0	1.3	.8	.....	.5	26	2.2	1.6	1.1	.4	.....	.....
12	3.4	1.9	1.3	.7	.....	.5	27	2.1	1.6	1.0	.4	.....	.....
13	3.3	1.9	1.3	.7	.....	.5	28	2.0	1.5	1.0	.35	.....	.....
14	3.2	1.9	1.3	.7	.....	.5	29	2.0	1.5	1.0	.3	.....	.....
15	3.1	1.8	1.3	.6	.....	.5	30	2.0	1.5	1.0	.25	.....	.....
							31	.....	1.5	.....	.25	.....	.....

NOTE.—Creek dry Aug. 3 until about Oct. 1. Gage readings for December refer to new gage with datum different from that of old. Water below gage Dec. 19 to 31. Gage heights somewhat affected by backwater from a dam below; observer notes changes in dam Apr. 23 and May 20 which no doubt, caused the increase in stage on those days.

Daily discharge, in second-feet, of Silver Creek near Riley, Oreg., for 1909.

Day.	Feb.[a]	Mar.	Apr.	May.	June.	July.	Aug.	Oct.	Nov.	Dec.
1	.....	16	201	52	19	5	2.5	0.0	9	7
2	.....	20	283	48	19	4	2.1	0.0	9	7
3	.....	24	344	44	16	4	2.1	0.1	8	8
4	.....	26	268	40	16	4	2.1	3	8	8
5	.....	16	254	42	14	4	2.1	4	5	8
6	.....	28	147	40	8	5	1.4	4	7	8
7	.....	25	121	36	9	5	1.1	4	7	8
8	.....	24	121	36	11	6	1.1	4	7	8
9	.....	22	167	32	9	6	0.8	3	6	8
10	.....	25	227	28	12	7	0.6	3	6	8
11	.....	24	201	28	11	12	0.2	4	5	8
12	.....	22	227	34	11	10	0.1	4	5	8
13	.....	22	313	34	10	8	0.1	5	5	7
14	.....	28	344	32	10	7	0.1	5	6	7
15	40	38	328	25	9	6	.1	4	6	7
16	178	52	283	36	9	4	.1	4	6	7
17	184	73	268	34	10	3	.1	4	6	7
18	52	62	201	28	10	3	.1	4	6	7
19	38	48	167	26	10	2.5	0	4	6	7
20	44	46	138	25	10	2.5	0	5	8	7
21	30	42	129	22	10	2.5	0	5	8	6
22	19	40	113	22	8	2.1	0	5	8	6
23	20	42	99	24	8	1.4	0	4	13	6
24	19	48	92	22	8	1.4	0	6	13	6
25	16	48	73	25	8	1.1	0	6	14	6
26	22	110	73	22	8	1.1	0	6	13	6
27	19	129	67	26	7	2.5	0	5	13	6
28	16	189	62	30	7	2.5	0	4	8	6
29	.....	201	62	30	6	2.5	0	5	6	6
30	.....	157	52	25	6	2.5	0	5	6	6
31	.....	157	.....	16	.....	2.5	0	6	.....	6

[a] Estimated mean Feb. 1 to 14, 25 second-feet.

Daily discharge, in second-feet, of Silver Creek near Riley, Oreg., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Dec.	Day.	Apr.	May.	June.	July.	Aug.	Dec.
1	.....	30	11	4	0.2	5	16	88	22	7	1	.....	6
2	.....	30	11	3	.1	6	17	79	22	5	2	.....	5
3	.....	35	11	3	0	6	18	71	22	5	2	.....	4
4	.....	40	9	3	.....	5	19	63	19	7	1	.....	3
5	.....	35	9	3	.....	4	20	50	22	7	1	.....	3
6	195	30	9	3	.....	6	21	45	22	7	.7	.....	3
7	177	26	9	3	.....	6	22	40	19	7	.7	.....	3
8	159	26	9	3	.....	6	23	50	19	7	.7	.....	3
9	159	22	9	3	.....	6	24	45	13	5	.7	.....	3
10	159	30	9	2	.....	6	25	40	13	5	.7	.....	3
11	148	30	9	2	.....	6	26	40	16	5	.7	.....	3
12	137	26	9	2	.....	6	27	35	16	4	.7	.....	3
13	127	26	9	2	.....	6	28	30	13	4	.6	.....	3
14	117	26	9	2	.....	6	29	30	13	4	.4	.....	3
15	107	22	9	2	.....	6	30	30	13	4	.3	.....	3
							31	.....	13	.....	.3	.....	3

NOTE.—Daily discharge for 1909 determined from a poorly defined discharge rating curve; determinations for individual days or weeks are liable to fairly large errors, but the mean for the whole period may not be much in error.

Mean daily discharge Feb. 1 to 14, 1909, estimated at 25 second-feet. Discharge derived from open-channel curve Dec. 13 to 31, 1909, reduced on account of ice.

Daily discharge April to August, 1910, determined from a fairly well-defined discharge rating curve. The curve for December is fairly well defined by measurements in 1911. Mean discharge Apr. 1 to 5, 1910, estimated at 200 second-feet; mean discharge Dec. 19 to 31, 1910, estimated at 3 second-feet.

Monthly discharge of Silver Creek near Riley, Oreg., for 1909–10.

[Drainage area, 266 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Mean per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1909.							
February	184	16	37.4	0.141	0.15	2,080	C.
March	201	16	58.2	.219	.25	3,580	C.
April	344	52	181	.680	.76	10,800	C.
May	52	16	31.1	.117	.13	1,910	C.
June	19	6	10.3	.039	.04	613	C.
July	12	1.1	4.20	.016	.02	258	C.
August	2.5	0	.54	.0020	.002	33	C.
September	0	0	0	0	0	0	C.
October	6	0	4.04	.015	.02	248	C.
November	14	5	7.77	.029	.03	462	C.
December	8	6	6.97	.026	.03	429	C.
The period	344	0	30.8	.116	1.43	20,800	
1910.							
April	.....	30	107	.402	.45	6,360	C.
May	40	13	22.9	.086	.10	1,410	C.
June	11	4	7.47	.028	.03	444	C.
July	4	.3	1.73	.0065	.007	106	C.
August	.2	0	.01	0	0	0	
September	0	0	0	0	0	0	
October	.....	.....	[a] 1.74	.0065	.007	107	C.
November	.....	.....	[a] 4.00	.015	.02	238	C.
December	6	.....	4.52	.017	.02	278	C.
The period	.....	0	16.4	.062	.63	8,940	

[a] Estimated.

GOOSE LAKE BASIN.

Consideration of the Goose Lake basin has been transferred to the report on the Sacramento drainage area owing to the fact that in times of exceptionally high water the lake has overflowed southward to the North Fork of Pit River, and to the possibility that considerable water may pass from the lake to the river by underground channels in the porous lava.

Data regarding the following gaging stations will be found in Water-Supply Paper 291:

Cottonwood Creek near Lakeview, Oreg.
Drews Creek near Lakeview, Oreg.

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous discharge measurements were made in the Great Basin drainage area during 1910:

Miscellaneous measurements in the Great Basin for 1909–10.

Date.	Stream.	Tributary to.	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1909.					
June 3	Peteetneet Creek	Utah Lake	3 miles from Payson, Utah		7.1
1910.					
Mar. 7	do	do	do		11.3
7	do	do	do		10.8
22	do	do	do		28.7
22	do	do	do		37.9
May 26	do	do	do		19.6
June 5	do	do	do		6.1
7	do	do	do		12.4
July 5	do	do	do		3.0
7	do	do	do		11.0
May 20	Tunnel drain	Diamond Fork, Utah	Strawberry tunnel		.51
Aug. 26	Owens River	Owens Lake	Hand ranch, Cal		76
Mar. 8	Horton Creek	Owens River	At road crossing, road from Round Valley to Bishop; SE. ¼ T. 6 S., R. 21 E., Cal.		7.4
Apr. 21	do	do	do		5.3
Aug. 12	Thibaut Creek	do	1 mile west of county road between Independence and Big Pine, Cal.		*a* .15 *a* .20
Sept. 6	do	do	do		*a* .20
May 19	Symmes Creek	do	2 miles west of county road near Independence, Cal.		3.5
June 22	do	do	do		3.8
July 16	do	do	do		*a* .1
Aug. 8	do	do	do		1.6
Sept. 7	do	do	do		0
May 25	Carroll Creek	Owens Lake	At highway crossing on Lone Pine–Olancha Road, Cal.		1.2
Oct. 11	West Carson River	Carson Lake	Woodfords, Cal., above all diversions.		33
Aug. 5	Clear Creek		State weir, at mouth of canyon, near Carson, Nev.		1.9
9	do		do		3.0
Oct. 9	do		do		5.1
Aug. 18	Carson River		Heiton Bridge		80
Nov. 11	Town Ditch	Carson River	Markleeville, Cal		6.1
Sept. 21	Adler Creek		Near mouth	0.69	3.5
21	Trout Creek		do		*a* .5
21	South Prosser Creek		Euers Valley	.23	.9
20	Donner Creek		Outlet of lake	.45	.5
19	Squaw Creek		Near mouth	1.69	1.3
Oct. 12	Long Valley Creek *b*		Red Rock, Cal		4.0

a Estimated. *b* By floats.

Miscellaneous measurements in Quinn River basin, Nev., for 1906.

[By E. D. Boyle, State engineer.]

Date.	Stream.	Locality.	Discharge per square mile.
			Sec.-ft.
May 5	Eightmile Creek	McConnell field	33
20	do	do	8
6	Flat Creek	Above Upper Flat Creek ranch	21
19	do	do	21
6	North Fork Flat Creek	Main road crossing	2.2
6	South Fork Flat Creek	do	12
7	Quinn River	400 feet below junction of main channel with Hardin slough.	84
20	do	do	62
5	Twelvemile Creek	Main road crossing	2.0
19	do	do	.8
19	do	Above all diversions	2.9

Miscellaneous measurements in Humboldt River basin, Nev., for 1910.

[By E. D. Boyle, State engineer.]

Date.	Stream.	Locality.	Discharge per square mile.
			Sec.-ft.
June 6	Bishop Creek	Below U-7 ranch [a]	8.6
Nov. 7	Duckwater Creek	Duckwater	24
Oct. 21	do	Brown Mills near Duckwater	6
June 2	Spring Creek	Divine ranch	1.9
1	Tom Cain Creek	Treutt ranch	4.1
4	Trout Creek	NW. ¼ SE. ¼ NW. ¼ sec. 11, T. 38 N., R. 61 E.	6.2
Oct. 29	Willard Creek	At Osceola ditch crossing, west side of Wheeler Peak.	1.0

[a] By floats.

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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 291

SURFACE WATER SUPPLY OF THE UNITED STATES

1910

PART XI. PACIFIC COAST IN CALIFORNIA

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

W. B. CLAPP, F. F. HENSHAW, AND
H. D. McGLASHAN

WASHINGTON
GOVERNMENT PRINTING OFFICE
1912

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SURFACE WATER SUPPLY OF PACIFIC COAST IN CALIFORNIA, 1910.

By W. B. Clapp, F. F. Henshaw, and H. D. McGlashan.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of measurements of the flow of certain streams in the United States. The work was performed by the water-resources branch of the United States Geological Survey, either independently or in cooperation with private or State organizations. The organic law of the Geological Survey (Stat. L., vol. 20, p. 394) contains the following paragraph:

> Provided that this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structures, mineral resources, and products of the national domain.

As water is the most abundant and most valuable of the minerals, the investigation of water resources is authorized under the provision for examining mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

The appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911	150,000

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor do they include all the streams that might purposefully be studied. The scope of the work is limited by the appropriations available. The field covered is the widest and the character of the work is believed to be the best possible under the controlling conditions. The work would undoubtedly have greater scientific importance and ultimately be of more practical value if the money now expended for wide areas were concentrated on a few small drainage basins; but such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be kept during a period of years long enough to determine within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum. The length of such a period manifestly differs for different streams. Experience has shown that the records for some streams should cover 5 to 10 years and those for other streams 20 years or even more, the limit being determined by the relative importance of the stream and the relation of the results to other long-time records on adjacent streams.

In the performance of this work an effort is made to reach the highest degree of precision possible with a rational expenditure of time and a judicious expenditure of a small amount of money. In all engineering work there is a point beyond which refinement is needless and wasteful, and this statement applies with especial force to stream-flow measurements. It is confidently believed that the stream-flow data presented in the publications of the Survey are in general sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of stations. All persons are cautioned to exercise the greatest care in using such incomplete records.

Records have been obtained at nearly 2,000 different points in the United States. The surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in Hawaii has also been investigated. During 1910 regular gaging stations were maintained by the survey and cooperating organizations at about 1,100 points in the United States, and many discharge measurements were made at other points. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular surface water-supply papers and in special papers from time to time.

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey have appeared in the annual reports, bulletins, and water-supply papers. Owing to natural processes of evolution and to changes in governmental requirements, the character of the work and the territory covered by these different publications have varied greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface water supply for 1910. The dividing line between the north Atlantic and south Atlantic drainage areas lies between York and James rivers.

Papers on surface water supply of the United States, 1910.

Part.	No.	Title.
I	281	North Atlantic coast.
II	282	South Atlantic coast and eastern Gulf of Mexico.
III	283	Ohio River basin.
IV	284	St. Lawrence River basin.
V	285	Upper Mississippi River and Hudson Bay basins.
VI	286	Missouri River basin.
VII	287	Lower Mississippi River basin.
VIII	288	Western Gulf of Mexico.
IX	289	Colorado River basin.
X	290	Great Basin.
XI	291	Pacific coast in California.
XII	292	North Pacific coast.

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey, exclusive of special papers:

Stream-flow data in reports of the United States Geological Survey.

[A.= Annual Report; B.= Bulletin; W S.= Water-Supply Paper.]

Report.	Character of data.	Year.
10th A., pt. 2	Descriptive information only	
11th A., pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A., pt. 2	....do	1884 to June 30, 1891.
13th A., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A., pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B. 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A., pt. 2	Descriptive information only	
B. 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W S. 11	Gage heights (also gage heights for earlier years)	1896.
18th A., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for earlier years).	1895 and 1896

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
W S. 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W S. 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W S. 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W S. 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A., pt. 4	Monthly discharge (also for many earlier years)	1898.
W S. 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A., pt. 4	Monthly discharge	1899.
W S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A., pt 4	Monthly discharge	1900.
W S. 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W S. 75	Monthly discharge	1901.
W S. 82 to 85	Complete data	1902.
W S. 97 to 100	....do	1903.
W S. 124 to 135	....do	1904.
W S. 165 to 178	....do	1905.
W S. 201 to 214	Complete data, except descriptions	1906.
W S. 241 to 252	Complete data	1907–8.
W S. 261 to 272	....do	1909.
W S. 281 to 292	....do	1910.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119.

The first table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1909. Wherever the data for a drainage basin appears in two papers the number of one is placed in parentheses and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas rivers.

Numbers of water-supply papers containing results of stream measurements, 1899–1910.

	1899[a]	1900[b]	1901	1902	1903	1904	1905	1906	1907–8	1909	1910
Atlantic coast and eastern Gulf of Mexico:											
New England rivers	35	47	65, 75	82	97	124	165	201	241	261	281
Hudson River to Delaware River, inclusive	35	47, (48)	65, 75	82	97	125	166	202	241	261	281
Susquehanna River to York River, inclusive	35	48	65, 75	82	97	126	167	203	241	261	281
James River to Yadkin River, inclusive	(35), 36	48	65, 75	(82), 83	(97), 98	126	167	203	242	262	282
Santee River to Pearl River, inclusive	36	48	65, 75	83	98	127	168	204	242	262	282
St. Lawrence River	36	49	65, 75	(82), 83	97	129	170	206	244	264	284
Hudson Bay	.....	.....	66, 75	85	100	130	171	207	245	265	285

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

Numbers of water-supply papers containing results of stream measurements, 1899-1910—Continued.

	1899	1900	1901	1902	1903	1904	1905	1906	1907–8	1909	1910
Mississippi River:											
Ohio River	36	48, (49)	65,75	83	98	128	169	205	243	263	283
Upper Mississippi River	36	49	65,75	83	98, (99)	128, (130)	171	207	245	265	285
Missouri River	(36), 37	49, (50)	66,75	84	99	130, (131)	172	208	246	266	286
Lower Mississippi River	37	50	(65), 66,75	(83), 84	(98), 99	(128), 131	(169), 173	(205), 209	247	267	287
Western Gulf of Mexico	37	50	66,75	84	99	132	174	210	248	268	288
Pacific coast and Great Basin:											
Colorado River	(37), 38	50	66,75	85	100	133, (134)	175, (177)	211, (213)	249, (251)	269, (271)	289
Great Basin	38, (39)	51	66,75	85	100	133, (134)	176, (177)	212, (213)	250, (251)	270, (271)	290
South Pacific coast to Klamath River, inclusive	(38), 39	51	66,75	85	100	134	177	213	251	271	291
North Pacific coast	38	51	66,75	85	100	135	(177), 178	214	252	272	292

Numbers of water-supply papers containing data covering portions of drainage basins.

No.	River basin.	Tributaries included.
35	James	
36	Missouri	Gallatin.
37	Colorado	Green, Gunnison, Grand above junction with Gunnison.
38	Sacramento	Except Kings and Kern.
39	Great Basin	Mohave.
48	Delaware	Wissahickon and Schuylkill.
49	Ohio	Scioto.
50	Missouri	Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte.
65	Lower Mississippi	Yazoo.
82	James	
	St. Lawrence	Lake Ontario, tributaries to St. Lawrence River proper.
83	Lower Mississippi	Yazoo.
97	James	
98	Lower Mississippi	Do.
99	Upper Mississippi	Tributaries from the west.
128	Lower Mississippi	Yazoo.
130	Upper Mississippi	Tributaries from the west.
131	Missouri	Platte, Kansas.
134	Colorado	Data near Yuma, Ariz., repeated.
	Great Basin	Susan, Owens, Mohave.
169	Lower Mississippi	Yazoo.
177	Colorado	Below junction with Gila.
	Great Basin	Susan repeated, Owens, Mohave.
	North Pacific coast	Rogue, Umpqua, Siletz.
205	Lower Mississippi	Yazoo, Homochitto.
213	Colorado	Data at Hardyville repeated; at Yuma, Salton Sea.
	Great Basin	Owens, Mohave.
251	Colorado	Yuma and Salton Sea stations repeated.
271	Great Basin	Owens River basin.

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined by measuring or estimating the drainage area; that is, the headwater stream having the largest drainage area is considered the continuation of the main stream and local changes in name and lake surface are disregarded. Records for all stations from the source to the mouth of the main stem of the river are presented first, and records for the tributaries in regular order from source to mouth follow, all records for each tributary basin being given before those of the next basin below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated above, and in the records for large lakes, where it is simpler to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in several terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units used in this series of reports are second-foot, second-feet per square mile, and run-off in inches and acre-foot. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents:

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. It is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.
1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.275 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.

1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches equals 96 Colorado miner's inches.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches equals 104 California miner's inches.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11} = \text{net horsepower on water wheel realizing 80 per cent of theoretical power.}$

EXPLANATION OF DATA

For each drainage basin there is given a brief general description covering such items as area, source, tributaries, topography, geology, forestation, rainfall, irrigation, storage, power, and other interesting or important facts.

For each regular current-meter gaging station the following data so far as available are given: Description of station, list of discharge measurements, table of daily gage heights, table of daily discharges,

table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

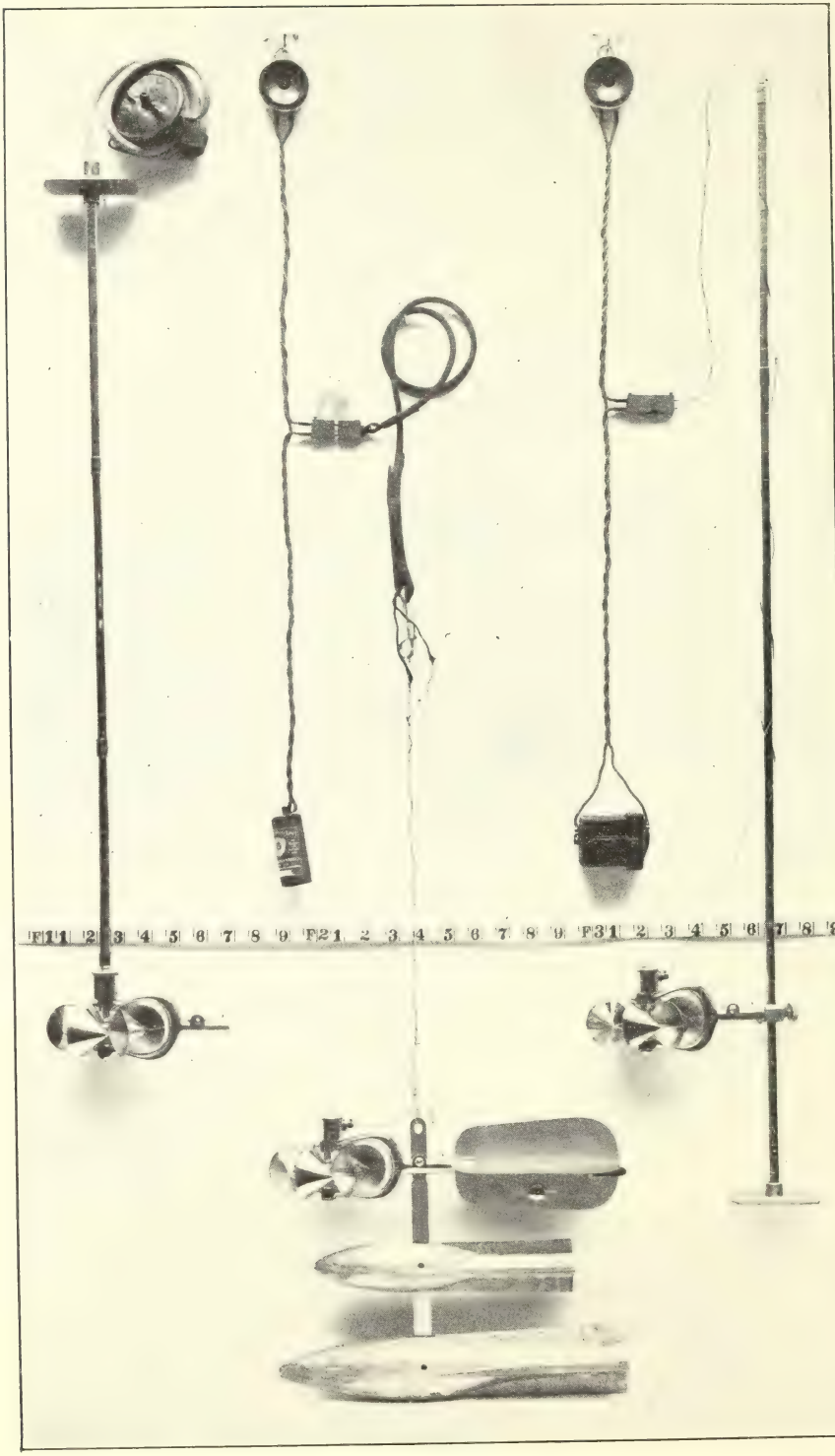
The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the daily gage heights and daily discharges for the purpose of verifying the published results as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height.

A. FOR BRIDGE MEASUREMENT.

B. FOR WADING MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater conditions.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 12, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909." Plate I shows typical gaging stations. Plate II shows the various types of current meters[1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream flow depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation of discharge to stage. Errors of the second group are due, first, to errors in observation of stage; second, to errors in measurements of flow; and third, to errors due to misinterpretation of stage and flow data.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are largely compensating, the mean rating curve, when well defined, is much more accurate than the individual measurements. Numerous experiments made to test the accuracy of current-meter work show that it compares very favorably with the results from standard weirs and, owing to simplicity of methods, usually gives results that are much

[1] See Hoyt, J. C., and others, Use and care of current meter as practiced by the United States Geological Survey; Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

more reliable than those from stations at dams where the coefficient may be uncertain and conditions of flow are complicated.

The work is, of course, dependent on the reliability of the gage observers. With relatively few exceptions, the observers perform their work honestly. The records are, however, closely watched and the cause of any discrepancy is investigated. It is obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in a period of one month, although a single day's reading may, when taken by itself, be considerably in error.

An effort is made to visit every station at least once each year for the purpose of making a measurement to determine the constancy of conditions of flow since the last measurement made in the preceding year, and also to check the elevation of the gage. On account of lack of funds or for other causes some stations were not visited during the current year. If conditions of flow have been reasonably permanent up to the time of the last preceding measurement, it is considered best to publish estimates of discharge based on the latest verified rating curve rather than to omit them altogether, although it should be distinctly understood that such records are at times subject to considerable error. This is also true, although to a less degree, of the period of records since the date of the last measurement of the current year. As a rule, the accuracy notes are based on the assumption that the rating curve used is strictly applicable to the current year.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily-discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly-discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly-discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

USE OF THE DATA.

In general the base data which are collected in the field each year by the Survey engineers are published, not only to comply with the law, but also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to year nearly always throw new light on data already collected and published, and hence allow more or less improvement in the computed results of earlier years. It is therefore expected that the engineer who makes use of the figures presented in these papers will verify all ratings and make such adjustments for earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for 5 or 10 year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The estimates in the table of monthly discharge are so arranged as to give only a general idea of the conditions of flow at the station, and it is not expected that they will be used for other than preliminary estimates.

The daily discharges are published to allow a more detailed study of the variation in flow and to determine the periods of deficient flow.

COOPERATIVE DATA.

Cooperative data of various kinds and data regarding the run-off at many stations maintained wholly by private funds are incorporated in the surface water-supply reports of the United States Geological Survey.

Many stations throughout the country are maintained for specific purposes by private parties who supply the records gratuitously to the United States Geological Survey for publication. When such records are furnished by responsible parties and appear to be reasonably accurate, they are verified, so far as possible, and estimated values of accuracy are given. As it is, however, impossible to verify completely all such records furnished—because of lack of funds or for other causes—they are published for what they are worth, as they are of value as a matter of record and afford at least approximate information regarding stream flow at the particular localities. The Survey does not, however, assume any responsibility for inaccuracies found in such records, although most of them are believed to be reasonably good. Records that are clearly worthless or misleading are not published.

COOPERATION AND ACKNOWLEDGMENTS.

The hydrographic work of the United States Geological Survey in California is being carried on in cooperation with the State in accordance with acts of the State legislature, approved March 16, 1903, March 20, 1905, March 11, 1907, and April 22, 1909.

The act of March 16, 1903, which covered the period from July 1, 1903, to June 30, 1905, is in substance as follows:

> The State board of examiners are hereby empowered to enter into contracts with the Director of the United States Geological Survey for the purpose of making topographic maps to the extent of twenty thousand dollars; also for the purpose of gaging streams, surveying reservoir sites and canal locations, for the conservation and utilization of the flood and storm waters of the State, to the extent of fifteen thousand dollars * * *.

The acts of March 20, 1905, and March 11, 1907, are in substance the same as the previous acts, the appropriations being increased to $30,000 for topography and $20,000 for hydrography and covering the four fiscal years July 1, 1905, to June 30, 1909. The act of April 22, 1909, appropriates $30,000 per annum for cooperation between the State and Federal Government for topography, hydrography, and use and distribution of water for agricultural purposes, this appropriation being made continuous.

Assistance has been rendered or records furnished by the following, to whom acknowledgment is due: Department of engineering of the State of California, Nathaniel Ellery, State engineer; James N. Gillett, governor; the United States Reclamation Service, for the records on Little Stony Creek near Lodoga, Cal., and in the Klamath River drainage basin in Oregon; the Kern County Land Co., through Mr. A. K. Warren, engineer in charge of water measurements, for the records of Kern River near Bakersfield; the Great Western Power Co., through Mr. H. H. Sinclair, general manager, for determinations of daily discharge on Feather River and tributaries.

Gage-height records have been furnished as follows: Santa Ynez River by the city of Santa Barbara, through Mr. Lee M. Hyde, supervising engineer for the board of water commissioners; Cottonwood Creek and flume by the Southern California Mountain Water Co.; San Joaquin River at Herndon by the Southern Pacific Co., through Mr. William Hood, chief engineer; Lagrange Water & Power Co.'s canal by Mr. Burton Smith, chief engineer of the Turlock irrigation district; Calaveras River by the United States Weather Bureau, through Mr. N. R. Taylor, local forecaster; North Fork of North Fork of Yuba River by Mr. John T. Mason; McCloud River by Mr. G. H. Lambson, superintendent of the United States Fishery; Sacramento River at Antler by Mr. C. H. Hamilton; Sacramento River at Castella by Mr. H. O. Wickes; Drews and Cottonwood creeks by Oregon Valley Land Co.; Rush Creek by Mr. Carl Peterson; Big Creek by Mr. John Lowery; South Fork of Merced

River by Mr. A. C. Leonard, park ranger; and South Fork of Tule River by the United States Indian Service, through Mr. A. P. Edmonson, Indian agent.

Stations located within or near the boundaries of national forests have been maintained in cooperation with the United States Forest Service, as noted in the descriptions of those stations.

DIVISION OF WORK.

The field work in California, except in the Klamath River basin, was carried on under the direction of W. B. Clapp by J. E. Stewart, W. V. Hardy, R. E. Haines, F. G. Wood, G. T. Peckema, H. J. Tompkins, T. W. Norcross, and H. D. McGlashan.

The ratings and special estimates were made by W. B. Clapp, F. F. Henshaw, and H. D. McGlashan. The computations were made and the completed data prepared for publication by G. C. Stevens, R. C. Rice, J. G. Mathers, H. D. Padgett, H. J. Dean, A. H. Tuttle, P. S. Monk, and M. I. Walters.

The field work in the Klamath River basin was carried on under the direction of W. W. Patch, project engineer, United States Reclamation Service, by J. C. Yadon and Leland Moser. The field data have been furnished by the United States Reclamation Service. The ratings and computations were made by F. F. Henshaw and E. S. Fuller.

The entire report was edited by Mrs. B. D. Wood.

GAGING STATIONS MAINTAINED IN PACIFIC COAST DRAINAGE BASINS IN CALIFORNIA.

The following list comprises the gaging stations regularly maintained in Pacific coast drainage basins in California by the United States Geological Survey and cooperative parties. Data for these stations have appeared in the published reports as shown in tables on pages 9 to 11. The stations are arranged by river basins and appear in downstream order, tributaries of main streams being indicated by indention. The stations are in California unless otherwise stated.

SOUTH PACIFIC OCEAN DRAINAGE BASINS.

Tia Juana River:
  Cottonwood Creek and Dulzura canal near Jamul, 1906–1910.
  Pine Valley Creek near Jamul, 1906–1908.
Sweetwater River near Descanso, 1906–1910.
San Diego River and San Diego flume near Lakeside, 1906–1910.
San Dieguito River:
  Santa Ysabel Creek near Escondido, 1906–1910.
San Luis Rey River near Pala, 1904–1910.
Santa Margarita River:
  Temecula Creek near Temecula, 1906.

Santa Ana River and Mentone Power Co.'s canal near Mentone, 1896–1910.
San Gabriel River and power canal near Azusa, 1896–1910.
Los Angeles River:
Arroyo Seco near Pasadena, 1910.
Malibu Creek near Calabasas, 1903–1906.
Triunfo Creek near Calabasas, 1903–1906.
Santa Ynez River near Santa Barbara, 1903–1910.
Santa Ynez River near Lompoc, 1906–1910.
Mono Creek near Santa Barbara, 1903–4.
Santa Maria River near Santa Maria, 1903–1905.
Salinas River near Salinas, 1900–1901.
Nacimiento River at Byron, February to April, 1901.
San Antonio River at Jylon, December, 1900, to April, 1901.
San Lorenzo Creek near Kings City, 1901-1903.
Arroyo Seco near Soledad, 1901–1910.

SAN FRANCISCO BAY DRAINAGE BASINS.

SAN JOAQUIN VALLEY.

San Joaquin River near Friant (Pollasky), 1907–1910.
San Joaquin River at Herndon, 1870–1910. (Gage height record only.)
Tulare Lake in Kings County, 1906–1910.
Kern River at Isabella, 1910.
Kern River near Bakersfield, 1893–1910.
Kern River, South Fork, at Isabella, 1910.
Tejon House Creek at Tejon ranch house, 1895–1896.
San Emidio Creek at San Emidio ranch house, 1894–1895.
White River:
Deer Creek at Hot Springs, 1910.
Tule River near Porterville, 1901–1910.
Tule River, South Fork, near Success, 1910.
Kaweah River below Three Rivers, 1903–1910.
Kaweah River, North Fork, at Kaweah, 1910.
Kings River near Sanger, 1895–1910.
Kings River at Kingsburg, 1895–1904.
Dinkey Creek near Ockenden, 1910.
Big Creek:
Rush Creek near Ockenden, 1910.
Fresno River near Fresno Flats, 1910.
North Fork Fresno River near Sugar Pine, 1910.
Merced River in Yosemite Valley, 1904–1909.
Merced River above Merced Falls, 1901–1910.
Tenaya Creek in Yosemite Valley, 1904–1909.
Yosemite Creek in Yosemite Valley, 1904–1909.
Merced River, South Fork, at Wawona, 1910.
Big Creek near Sugar Pine, 1910.
Tuolumne River at Hetch Hetchy Valley dam site, 1901.
Tuolumne River near Lagrange, 1895–1910.
Modesto Canal near Lagrange, 1903–1910.
Turlock Canal near Lagrange, 1899–1910.
Lagrange Water and Power Co.'s canal near Lagrange, 1907–1910.

San Joaquin River—Continued.
Tuolumne River at Modesto, 1895–1897.
Cherry Creek at Eleanor trail crossing, 1901.
Eleanor Creek at Eleanor trail crossing, 1901.
Jawbone Creek near Tuolumne, 1910.
Corral Creek near Groveland, 1910.
Tuolumne River, South Fork, near Groveland, 1910.
Clavey River near Tuolumne, 1910.
Indian Creek near Tuolumne, 1910.
Tuolumne River, North Fork, near Tuolumne, 1910.
Hunter Creek near Tuolumne, 1910.
Stanislaus River at Knights Ferry, 1895–1900, 1903–1910.
Rose Creek near Jupiter, 1910.
Knight Creek near Jupiter, 1910.
Stanislaus River, South Fork, near Columbia, 1910.
Stanislaus Water Co.'s canal at Knights Ferry, 1904–1910.
Calaveras River at Jenny Lind, 1907–1910.
Mokelumne River at Electra, 1901 and 1903–4.
Mokelumne River near Clements, 1904–1910.
Mokelumne River near Lodi, 1895.
Cosumnes River at Michigan Bar, 1907–1910.

SACRAMENTO VALLEY.

Sacramento River at Castella, 1910.
Sacramento River at Antler, 1910.
Sacramento River at Jellys Ferry, near Red Bluff, 1895–1902.
Sacramento River at Iron Canyon, near Red Bluff, 1902–1910.
Sacramento River at Collinsville, 1878–1885.
Sacramento River at Sacramento, 1904–5 (gage heights only).
Pit River near Canby, 1904–5.
Pit River near Bieber, 1904–1908.
Pit River at Henderson, 1910.
Pit River at Silverthorne Ferry, near Ydalpom, 1910.
Cottonwood Creek (tributary to Goose Lake) near Lakeview, Oreg., 1908–1910.
Drews Creek (tributary to Goose Lake) near Lakeview, Oreg. 1909–1910.
Pit River, South Fork, near Ivy, 1904–5.
West Valley Creek near Likely, 1904–5.
Ash Creek at Adin, 1904–5.
Hat Creek at Hat Creek, 1910.
Kosk Creek near Henderson, 1910.
McCloud River near Gregory, 1902–1908.
McCloud River at Baird, 1910.
Cottonwood Creek:
Cottonwood Creek, North Fork, at Ono, 1907–1910.
Mill Creek near Los Molinos, 1909–1910.
Stony Creek near Fruto, 1901–1910.
Little Stony Creek near Lodoga, 1907–1910.
Feather River, North Fork, above Prattville, 1905–1907.
Feather River, North Fork, below Prattville, 1905–1910.
Feather River, North Fork, near Big Bend, 1905–1910.
Feather River at Oroville, 1902–1910.
Hamilton Branch near Prattville, 1905–1909.

Sacramento River—Continued.
Feather River—Continued.
Butt Creek at Butte Valley, 1905–1910.
Indian Creek near Crescent Mills, 1905–1909.
Feather River, Middle Fork, at Cromberg, 1910.
Grizzly Creek near Beckwith, 1906.
Yuba River, Middle Fork[1] (head of Yuba River), near North San Juan, 1900 and 1910.
Yuba River near Smartsville, 1903–1910.
Yuba River at Parks Bar Bridge, near Smartsville, 1900.
Oregon Creek near North San Juan, 1910.
Yuba River, North Fork,[2] at Goodyear Bar, 1910.
Yuba River, North Fork,[2] near North San Juan, 1900.
Yuba River, North Fork of North Fork,[3] at Downieville, 1910.
Rock Creek at Goodyear Bar, 1910.
Goodyear Creek at Goodyear Bar, 1910.
Bear River at Van Trent, above Wheatland, 1904–1910.
American River near Fairoaks, 1904–1910.
Cache Creek at Lower Lake, 1901–1910.
Cache Creek near Yolo, 1903–1910.
Putah Creek near Guenoc, 1904–1906.
Putah Creek at Winters, 1905–1910.

NORTH PACIFIC OCEAN DRAINAGE BASINS.

Russian River at Geyserville, 1910.
South Eel River at Hearst, 1910.
Eel River at Scotia, 1910.
Mad River near Arcata, 1910.
Sprague River (head of Klamath River) at Yainax, Oreg., 1904.
Upper Klamath Lake (on Klamath River) near Klamath Falls, Oreg., 1904–1910.
Link River (continuation of Klamath River between Upper Klamath Lake and Lake Ewauna) at Klamath Falls, Oreg., 1904–1910.
Lower Klamath Lake near Brownell, 1907–1909.
Klamath River at Keno, Oreg., 1904–1910.
Klamath River near Requa, 1910.
Sycan River near Silverlake, Oreg., 1905.
Williamson River at Klamath Agency, Oreg., 1909–1910.
Lost River at Clear Lake, 1904–1909.
Lost River at Olene, Oreg., 1907–1910.
Lost River near Merrill, Oreg., 1904–1908.
Tule Lake near Merrill, Oreg., 1904–1910.
Miller Creek near Lorella, Oreg., 1904–1910.
Scott River:
Scott River, East Fork, near Callahan, 1910.
Trinity River near Trinity Center, 1910.
Coffee Creek near Coffee, 1910.
Trinity River, East Fork, near Trinity Center, 1910.
Swift Creek near Trinity Center, 1910.

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[1] Known locally as Middle Yuba River.
[2] Known locally as North Yuba River.
[3] Known locally as North Fork of North Yuba River.

SOUTH PACIFIC OCEAN DRAINAGE BASINS.

GENERAL FEATURES.

The South Pacific Ocean drainage basins include all streams south of San Francisco Bay that drain the western slope of the Coast Range and enter the Pacific either directly or indirectly. The average width of the region thus drained is nearly 50 miles and its total area is 23,000 square miles. The low-water flow of the streams of this area is very small, and in many of them all the water disappears in the sand and gravel beds below the canyons. In the winter, however, the streams are torrential and discharge large volumes of water. North of Santa Barbara the general course of the streams is northwestward; south of Santa Barbara, however, which is approximately opposite the intersection of the Coast Range by the Tehachapi Range, the general direction is southwestward.

TIA JUANA RIVER BASIN.

COTTONWOOD CREEK AND DULZURA CANAL NEAR JAMUL, CAL.

Tia Juana River discharges into the Pacific Ocean below San Diego Bay, near the Mexican boundary. Its principal tributary, Cottonwood Creek, rises in the Laguna Mountains of the Coast Range, and flows south and west for about 20 miles, where it is joined by Pine Valley Creek from the north; it then flows southwestward 12 miles to its junction with Tia Juana River at the Mexican boundary, about 22 miles east of the coast line. The total drainage area of Cottonwood Creek above its junction with Tia Juana River is approximately 340 square miles. It lies south of the Sweetwater and Otay River basins and is the most southerly stream in San Diego County. Pine Valley Creek is its only important tributary.

The gaging station, which was established December 14, 1905, is at the Barrett dam site, in SW. $\frac{1}{4}$ sec. 15, T. 17 S., R. 3 E., 6 miles above the San Diego Campo road, and 12 miles east of Jamul.

Pine Valley Creek enters Cottonwood Creek 1 mile and Lyons Creek half a mile above the gaging station. The drainage area above the station, including Pine Valley Creek, is 270 square miles.

The Southern California Mountain Water Co. diverts water from Pine Valley and Cottonwood creeks about half a mile above their junction, by way of Dulzura canal (13.4 miles long) to the headwaters of Dulzura Creek, whence it flows 12 miles to lower Otay reservoir, which supplies water to the city of San Diego. The capacity of the canal is about 60 second-feet. The amount diverted is measured in the diversion flume about $1\frac{1}{2}$ miles below the intake and one-fourth mile below the station on Cottonwood Creek. A staff gage is located at the measuring section in the flume.

Several gages with independent datums have been installed at this station. Two vertical staff gages are now used. The upper one is on the left bank near the end of the dam and reads the depth of the water on the crest of the dam. The lower gage is on the upstream side of the dam near the right bank, and its datum is 2.50 feet lower. Gage heights for 1909 and 1910 are referred to lower gage datum.

Discharge measurements to determine the excess water not diverted to the lower Otay reservoir are made at the low concrete dam, back of which sand and gravel have been deposited to the level of its crest. At low stages the flow is restricted to a rectangular wooden opening through the wall of the dam, but at high stages the flow is over the entire length of the dam, which is 61 feet. Measurements are made by wading, except at high water, when floats are used.

The gage height records are furnished by the Southern California Mountain Water Co. The results obtained are only fair.

Discharge measurements of Cottonwood Creek and Dulzura canal near Jamul, Cal., 1910.

Creek.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 24	W. V. Hardy	8	2.8	0.50	5.7
Mar. 13	do	5	1.4	.31	2.2
June 5	do	1	.3	.10	.4

Canal.

Jan. 25	W. V. Hardy	4.8	2.4	0.45	0.9
Do.	do	4.8	2.8	.49	1.1
Do.	do	4.8	3.4	.62	2.3
Do.	do	4.8	4.8	.94	6.1
Do.	do	4.8	6.3	1.26	12
Do.	do	4.8	7.8	1.56	18
Do.	do	4.8	11	2.23	26
Do.	do	4.8	13	2.75	38
Do.	do	4.8	16	3.28	48
Do.	do	4.8	17	3.50	53
Mar. 13	do	4.8	9	1.85	19
June 5	do	4.9	1.0	.37	.8

Daily gage height, in feet, of Cottonwood Creek near Jamul, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	[a] 2.40	0.44	0.40	2.35	0.16	0.09	0.02				0.22	0.29
2	1.60	.40	.39	2.15	.16	.11	.02				.26	.29
3	1.90	.41	.39	2.05	.15	.11	.02				.35	.28
4	1.25	.44	.39	1.40	.22	.11	.01				.45	.28
5	2.50	.42	.35	.55	.21	.09	.00				.35	.31
6	1.95	.42	.35	.42	.28	.08					.29	.31
7	1.55	.42	.38	.41	.30	.09					.29	.29
8	1.40	.39	.31	.38	.28	.08					.29	.29
9	1.30	.34	.36	.38	.19	.06					.29	.29
10	1.05	.32	.35	.35	.18	.05					.26	.29
11	1.20	.36	.34	.32	.18	.05					.26	.28
12	1.25	.32	.31	.40	.16	.05					.29	.26
13	.90	.31	.31	.39	.18	.05					.35	.26
14	1.30	.32	.32	.31	.18	.05					.58	.29
15	1.55	.34	.32	.30	.19	.18					.44	.26

[a] Maximum, 3.8 feet. Corresponding discharge, 695 second-feet.

Daily gage height, in feet, of Cottonwood Creek near Jamul, Cal., for 1910—Continued.

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	3.00	0.33	0.32	0.31	0.19	0.18					0.38	0.26
17	2.85	.30	.35	.29	.18	.18					.32	.28
18	1.90	.32	.42	.29	.19	.11					.30	.28
19	1.65	.42	.35	.22	.16	.09				0.02	.39	.29
20	1.35	1.25	.32	.22	.19	.08				.04	.31	.35
21	.95	.82	.32	.22	.18	.02				.08	.36	.30
22	.80	.45	.32	.22	.18	.08				.06	.30	.30
23	.61	.40	.32	.19	.15	.06				.12	.29	.29
24	.50	.40	.32	.55	.14	.06				.11	.29	.29
25	.58	.41	.38	.20	.14	.06				.09	.29	.28
26	.50	.40	.62	.20	.12	.05				.11	.32	.32
27	.46	.40	.90	.16	.12	.02				.12	.30	.26
28	.45	.35	2.40	.20	.09	.02				.15	.30	.28
29	.41		2.15	.16	.12	.02				.18	.30	.25
30	.42		1.70	.15	.09	.02				.20	.31	.25
31	.40		1.75		.08					.21		.31

NOTE.—No water in creek from July 4 to Oct. 18.

Daily discharge, in second-feet, of Cottonwood Creek near Jamul, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	69	4.8	4.0	65	0.8	0.4	0.1				1.3	2.2
2	33	4.0	3.8	54	.8	.5	.1				1.8	2.2
3	43	4.2	3.8	49	.7	.5	.1				3.1	2.1
4	23.4	4.8	3.8	27.3	1.3	.5	.0				5.0	2.1
5	78	4.4	3.1	7.0	1.2	.4	.0				3.1	2.5
6	45	4.4	3.1	4.4	2.1	.3					2.2	2.5
7	31.5	4.4	3.6	4.2	2.3	.4					2.2	2.2
8	27.3	3.8	2.5	3.6	2.1	.3					2.2	2.2
9	24.7	3.0	3.3	3.6	1.0	.2					2.2	2.2
10	18.3	2.6	3.1	3.1	1.0	.2					1.8	2.2
11	22.1	3.3	3.0	2.6	1.0	.2					1.8	2.1
12	23.4	2.6	2.5	4.0	.8	.2					2.2	1.8
13	14.7	2.5	2.5	3.8	1.0	.2					3.1	1.8
14	24.7	2.6	2.6	2.5	1.0	.2					7.7	2.2
15	31.5	3.0	2.6	2.3	1.0	1.0					4.8	1.8
16	190	2.8	2.6	2.5	1.0	1.0					3.6	1.8
17	145	2.3	3.1	2.2	1.0	1.0					2.6	2.1
18	43	2.6	4.4	2.2	1.0	.5					2.3	2.1
19	34.5	4.4	3.1	1.3	.8	.4				0.1	3.8	2.2
20	26	23.4	2.6	1.3	1.0	.3				.2	2.5	3.1
21	15.9	12.9	2.6	1.3	1.0	.1				.3	3.3	2.3
22	12.5	5.0	2.6	1.3	1.0	.3				.2	2.3	2.3
23	8.3	4.0	2.6	1.0	.7	.2				.5	2.2	2.2
24	6.0	4.0	2.6	7.0	.7	.2				.5	2.2	2.2
25	7.7	4.2	3.6	1.1	.7	.2				.4	2.2	2.1
26	6.0	4.0	8.5	1.1	.5	.2				.5	2.6	2.6
27	5.2	4.0	14.7	0.8	.5	.1				.5	2.3	1.8
28	5.0	3.1	69	1.1	.4	.1				.8	2.3	2.1
29	4.2		54	.8	.5	.1				1.0	2.3	1.7
30	4.4		36	.7	.4	.1				1.1	2.5	1.7
31	4.0		37.5		.3					1.2		2.5

NOTE.—No water in the creek from July 4 to Oct. 18. Daily discharge determined from a rating curve (the same as that for 1909) fairly well defined below discharge of 55 second-feet.

Monthly discharge of Cottonwood Creek near Jamul, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	190	4.0	33.1	2,040	C.
February	23.4	2.3	4.68	260	B.
March	69	2.5	9.57	588	B.
April	65	.7	8.74	520	B.
May	2.3	.3	.95	58	C.
June	1.0	.1	.34	20	C.
July	.1	.0	.01	1	D.
August	.0	.0	.00	0	
September	.0	.0	.00	0	
October	1.2	.0	.24	15	C.
November	7.7	1.3	2.78	165	B.
December	3.1	1.7	2.16	133	B.
The year	190	.0	5.25	3,800	

Daily gage height, in feet, of Dulzura canal near Jamul, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	1.85	3.0	2.2	.....	1.2	0.3	16	3.65	2.5	1.9	2.1	0.82	.....
2	.....	3.35	2.15	.....	1.3	.32	17	3.6	2.3	2.1	1.9	.7	.....
3	1.6	3.0	2.1	.....	1.3	.32	18	3.5	2.4	2.6	1.85	.65	.....
4	3.4	2.75	2.05	1.3	1.25	.32	19	3.7	2.6	2.4	1.7	.65	.....
5	3.35	2.85	2.0	2.65	1.15	.34	20	3.65	3.5	2.2	1.65	.85	.....
6	3.6	2.7	2.0	2.8	1.1	.3	21	3.7	2.8	2.0	1.65	.8	.....
7	3.8	2.7	2.0	2.7	.98	.3	22	3.7	2.8	2.2	1.5	.75	.....
8	3.7	2.75	2.0	2.5	.92	.3	23	3.7	2.7	2.4	1.45	.7	.....
9	3.7	2.75	2.1	2.4	.9	.26	24	3.7	2.5	2.1	.65	.6	.....
10	3.7	2.7	1.9	2.4	.9	.2	25	3.4	2.6	2.3	1.25	.55	.....
11	3.65	2.55	1.8	2.4	.88	.15	26	3.4	2.4	3.65	1.15	.55	.....
12	3.7	2.5	1.8	3.2	.8	.15	27	3.25	2.4	3.4	1.05	.52	.....
13	3.55	2.45	1.8	3.0	.8	.12	28	3.15	2.25	3.55	1.15	.45	.....
14	3.45	2.45	1.75	2.55	.8	.15	29	3.15	.....	3.6	1.15	.41	.....
15	3.5	2.6	1.85	2.3	.85	.....	30	3.05	.....	3.6	1.2	.28	.....
							31	2.9	.....	3.65	.....	.32	.....

NOTE.—No water diverted through canal on days of no gage height, or from June 15 to Dec. 26.

Daily discharge, in second-feet, of Dulzura canal near Jamul, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Dec.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Dec.
1	20.6	42	26.6	0.0	10.3	0.4	.....	16	55	32.1	21.5	24.9	4.8	.....	.....
2	.0	49	25.7	.0	11.8	.5	.....	17	54	28.4	24.9	21.5	3.2	.....	.....
3	16.6	42	24.9	.0	11.8	.5	.....	18	52	30.2	34	20.6	2.6	.....	.....
4	50	37	24	11.8	11.0	.5	.....	19	56	34	30.2	18.2	2.6	.....	.....
5	49	39	23.2	35	9.5	.5	.....	20	55	52	26.6	17.4	5.2	.....	.....
6	54	36	23.2	38	8.8	.4	.....	21	56	38	23.2	17.4	4.5	.....	.....
7	58	36	23.2	36	7.0	.4	.....	22	56	38	26.6	15.0	3.8	.....	.....
8	56	37	23.2	32.1	6.2	.4	.....	23	56	36	30.2	14.2	3.2	.....	.....
9	56	37	24.9	30.2	5.9	.3	.....	24	56	32.1	24.9	2.6	2.1	.....	.....
10	56	36	21.5	30.2	5.9	.2	.....	25	50	34	28.4	11.0	1.6	.....	.....
11	55	33	19.8	30.2	5.6	.2	.....	26	50	30.2	55	9.5	1.6	.....	.....
12	56	32.1	19.8	26.6	4.5	.2	.....	27	47	30.2	50	8.0	1.4	.....	0.4
13	53	31.1	19.8	42	4.5	.1	.....	28	45	27.5	53	9.5	.9	.....	.4
14	51	31.1	19.0	33	4.5	.2	.....	29	45	.....	54	9.5	.7	.....	.4
15	52	34	20.6	28.4	5.2	.....	.....	30	43	.....	54	10.3	.4	.....	.4
								31	40	.....	55	.....	.4	.....	.4

NOTE.—No water diverted from June 15 to Dec. 26. The daily discharges were obtained from a rating curve well defined between 0.7 second-foot and 54 second-feet.

Monthly discharge of Dulzura canal near Jamul, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	58	0.0	48.4	2,980	A.
February	52	27.5	35.5	1,970	A.
March	55	19	30.0	1,840	A.
April	42	.0	19.4	1,150	A.
May	11.8	.4	4.89	301	A.
June (1–15)	.5	.0	.32	10	B.
The period				8,250	

Daily discharge, in second-feet, of Cottonwood Creek and Dulzura canal near Jamul, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Oct.	Nov.	Dec.
1	90	47	31	65	11	0.8	0.1	.....	1.3	2.2
2	33	53	30	54	13	.9	.1	.....	1.8	2.2
3	61	46	29	49	12	.9	.1	.....	3.1	2.1
4	73	42	28	39	12	.9	.....	.....	5.0	2.1
5	127	43	26	42	11	.9	.....	.....	3.1	2.5
6	99	40	26	42	11	.7	.....	.....	2.2	2.5
7	90	40	27	40	9.3	.8	.....	.....	2.2	2.2
8	83	41	26	36	8.3	.7	.....	.....	2.2	2.2
9	81	40	28	34	6.9	.6	.....	.....	2.2	2.2
10	74	39	25	33	6.9	.4	.....	.....	1.8	2.2
11	77	36	23	33	6.6	.4	.....	.....	1.8	2.1
12	79	35	22	31	5.3	.4	.....	.....	2.2	1.8
13	68	34	22	46	5.5	.3	.....	.....	3.1	1.8
14	76	34	22	36	5.5	.4	.....	.....	7.7	2.2
15	84	37	23	31	6.2	1.0	.....	.....	4.8	1.8
16	245	35	24	27	5.8	1.0	.....	.....	3.6	1.8
17	199	31	28	24	4.2	1.0	.....	.....	2.6	2.1
18	95	33	38	23	3.6	.5	.....	.....	2.3	2.1
19	90	38	33	20	3.4	.4	.....	0.1	3.8	2.2
20	81	75	29	19	6.2	.3	.....	.2	2.5	3.1
21	72	51	26	19	5.5	.1	.....	.3	3.3	2.3
22	68	43	29	16	4.8	.3	.....	.2	2.3	2.3
23	64	40	33	15	3.9	.2	.....	.5	2.2	2.2
24	62	36	28	9.6	2.8	.2	.....	.5	2.2	2.2
25	58	38	32	12	2.3	.2	.....	.4	2.2	2.1
26	56	34	64	11	2.1	.2	.....	.5	2.6	2.6
27	52	34	65	8.8	1.9	.1	.....	.5	2.3	2.2
28	50	31	122	11	1.3	.1	.....	.8	2.3	2.5
29	49	.....	108	10	1.2	.1	.....	1.0	2.3	2.1
30	47	.....	90	11	.8	.1	.....	1.1	2.5	2.1
31	44	.....	92	.....	.7	.....	.....	1.2	.....	2.9

Monthly discharge of Cottonwood Creek and Dulzura canal near Jamul, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	245	33	81.5	5,010
February	75	31	40.2	2,230
March	122	22	39.6	2,430
April	65	8.8	28.2	1,680
May	13	.7	5.84	359
June	1	.1	.50	30
July	.1	.0	.01	1
August	.0	.0	.00	0
September	.0	.0	.00	0
October	1.2	.0	.24	15
November	7.7	1.3	2.78	165
December	3.1	1.8	2.20	135
The year	245	.0	16.7	12,100

SWEETWATER RIVER BASIN.

SWEETWATER RIVER NEAR DESCANSO, CAL.

Sweetwater River rises in the south and east slope of the Cuyamaca Mountains of the Coast Range, flows nearly due south for a distance of 15 miles, then turns to the west and southwest and discharges into San Diego Bay south of National City. Its length is 45 miles and its area comprises approximately 215 square miles, the greater part of which is in mountainous country. The basin is extremely narrow. It lies directly south of San Diego River and north of the Otay and Cottonwood Creek basins.

A record of run-off kept at the Sweetwater reservoir from 1888 to 1905 by the San Diego Land & Town Co. was published in Water-Supply Paper 251, 1910, page 106.

The gaging station, which is located at the Ellis ranch, 1½ miles below Descanso post office, in the SE. ¼ sec. 25, T. 15 S., R. 3 E., was established November 21, 1905.

Guatay Creek enters the river from the east about 2 miles above the gaging station. About one-fourth second-foot of water is diverted above the station for irrigation on the Ellis ranch. About 20 miles below water for irrigation is pumped from wells along the banks of the stream.

The staff gage is in three sections on the left bank. No change has been made in the datum of the gage since the station was established. Discharge measurements are made from a cable or by wading near the gage.

Discharge for 1910 was estimated by the indirect method for shifting channels and from rating tables covering short periods. The record may be considered fair.

Discharge measurements of Sweetwater River near Descanso, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 23	W. V. Hardy	22	11	4.20	32
27	do	20	8	4.10	22
Feb. 14	do	17	6.3	3.95	12
17	do	17	6	3.93	13
Mar. 3	do	17	5.1	3.94	9.2
4	do	17	5.1	3.92	8.8
12	do	17	4.4	3.88	6.7
14	do	8	3.4	3.86	7.6
Apr. 2	do	17	8	4.02	17
3	do	17	8	4.12	20
26	do	10	3.2	4.10	6.7
May 7	do	8	2.8	4.08	5.7
24	do	6	2.4	3.98	4.6
26	do	7	2.1	3.92	3.4
June 4	do	4	1.2	3.84	2.4
25	do	3	.9	3.68	1.2
Sept. 18	C. C. Jacob	1.3	.36	3.59	.34
Nov. 16	W. V. Hardy	2	.8	3.55	1.3

NOTE.—All measurements were made by wading near the gage.

Daily gage height, in feet, of Sweetwater River near Descanso, Cal., for 1910.

[Chas. H. Ellis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.05	4.08	.....	4.17	4.11	3.82	3.64	.....	3.53	3.52	3.56	3.48
2	4.75	4.08	.....	4.12	4.11	3.81	3.64	.....	3.53	3.52	3.56	3.48
3	4.85	4.02	3.94	4.12	4.14	3.81	3.64	.....	3.53	3.51	3.60	3.48
4	4.60	4.00	3.94	4.10	4.13	3.81	3.64	.....	3.53	3.51	3.54	3.48
5	4.54	4.00	.....	4.08	4.13	3.79	3.64	.....	3.52	3.51	3.54	3.48
6	4.39	4.00	3.91	4.06	4.11	3.79	3.64	.....	3.51	3.51	3.52	3.48
7	4.32	4.00	3.91	4.06	4.11	3.78	3.64	.....	3.51	3.51	3.52	3.48
8	4.25	4.00	3.91	4.06	4.09	3.78	3.64	.....	3.51	3.51	3.52	3.48
9	4.20	3.99	3.91	4.06	4.07	3.77	3.64	.....	3.51	3.51	3.52	3.48
10	4.20	3.99	3.91	4.04	4.04	3.76	3.64	.....	3.51	3.51	3.52	3.49
11	4.19	3.98	3.90	4.11	4.02	3.76	3.64	.....	3.50	3.51	.....	3.50
12	4.16	3.97	3.89	4.21	4.00	3.75	3.64	.....	3.50	3.51	.....	3.50
13	4.15	3.97	3.88	4.14	4.00	3.74	3.67	.....	3.52	3.52	.....	3.49
14	4.15	3.96	3.92	4.09	4.00	3.72	3.66	3.54	3.55	3.58	.....	3.50
15	4.40	3.96	3.92	4.06	4.00	3.71	3.64	3.54	3.52	3.72	.....	3.50
16	4.95	3.94	3.90	4.01	4.00	3.70	3.64	3.54	3.50	3.68	3.55	3.50
17	4.6	3.94	3.93	3.99	4.00	3.70	3.64	3.54	3.59	3.61	3.52	3.50
18	4.58	3.92	3.94	3.97	4.00	3.70	3.64	3.54	3.59	3.59	3.52	3.50
19	4.52	4.02	3.91	3.95	4.00	3.69	3.64	3.54	3.59	3.56	3.52	3.54
20	4.45	4.15	3.88	3.97	3.99	3.68	3.62	3.54	3.59	3.55	3.52	3.64
21	4.35	4.00	3.84	3.99	3.97	3.68	3.62	3.54	3.59	3.54	3.52	3.60
22	4.20	3.93	3.91	3.98	3.96	3.68	3.62	3.54	3.59	3.54	3.52	3.56
23	4.20	3.92	3.94	3.96	3.95	3.68	3.62	3.54	3.59	3.54	3.50	3.52
24	4.18	3.92	3.86	3.95	3.94	3.68	3.61	3.54	3.59	3.54	3.50	3.50
25	4.12	3.93	4.04	3.97	3.92	3.67	3.61	3.54	3.59	3.54	3.50	3.52
26	4.10	3.93	4.12	3.99	3.92	3.66	3.61	3.54	3.59	3.54	3.50	3.53
27	4.10	3.93	4.12	4.01	3.88	3.66	3.60	3.54	3.59	3.54	3.50	3.51
28	4.09	3.93	4.35	4.01	3.87	3.66	3.62	3.53	3.57	3.54	3.50	3.50
29	4.06	.....	4.22	4.09	3.86	3.66	3.62	3.53	3.55	3.56	3.50	3.49
30	4.04	.....	4.20	4.11	3.84	3.66	3.62	3.53	3.54	3.56	3.50	3.49
31	4.02	.....	4.18	.....	3.82	.....	3.62	3.53	.....	3.56	.....	3.48

Daily discharge, in second-feet, of Sweetwater River near Descanso, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	479	19	10	25	6.0	2.3	0.7	0.4	0.1	0.1	1.5	2.0
2	116	19	10	20	6.0	2.2	.7	.4	.1	.1	1.5	2.0
3	138	16	10	20	7.0	2.2	.7	.4	.1	.05	2.0	2.0
4	88	15	10	19	7.0	2.2	.7	.4	.1	.05	1.5	2.0
5	78	15	9.0	17	7.0	2.0	.7	.4	.1	.05	1.5	2.0
6	56	15	8.0	16	6.0	2.0	.7	.4	.05	.05	1.0	2.0
7	47	15	8.0	15	6.0	1.9	.7	.3	.05	.05	1.0	2.0
8	38	15	8.0	15	6.0	1.9	.7	.3	.05	.05	1.0	2.0
9	32	14	8.0	14	6.0	1.8	.7	.3	.05	.05	1.0	2.0
10	32	14	8.0	13	5.0	1.7	.7	.3	.05	.05	1.0	2.0
11	31	14	8.0	15	4.9	1.7	.7	.3	.0	.05	1.0	2.5
12	27	13	7.0	19	4.6	1.6	.7	.3	.0	.05	3.0	2.5
13	26	13	7.0	15	4.6	1.5	.9	.3	.1	.1	2.0	2.5
14	26	13	8.0	13	4.6	1.3	.8	.2	.2	.3	4.0	2.5
15	57	13	9.0	11	4.6	1.2	.7	.2	.1	3.0	3.0	2.5
16	160	13	9.0	9.0	4.6	1.1	.7	.2	.0	2.5	1.3	2.5
17	88	13	10	9.0	4.6	1.1	.7	.2	.4	2.0	1.0	2.5
18	85	12	11	9.0	4.6	1.1	.7	.2	.4	1.5	1.0	2.5
19	75	16	10	8.0	4.6	1.0	.7	.2	.4	1.5	1.0	3.0
20	64	22	10	8.0	4.5	1.0	.5	.2	.4	1.5	1.0	5.0
21	50	14	9.0	7.0	4.2	1.0	.5	.2	.4	1.5	1.0	4.0
22	32	12	11	7.0	4.0	1.0	.5	.2	.4	1.5	1.0	3.5
23	32	11	12	6.0	3.9	1.0	.5	.2	.4	1.5	1.5	3.0
24	30	11	10	6.0	3.8	1.0	.5	.2	.4	1.5	1.5	3.0
25	22	11	17	5.0	3.5	.9	.5	.2	.4	1.5	1.5	3.0
26	20	11	21	5.0	3.5	.8	.5	.2	.4	1.5	1.5	3.0
27	20	11	21	5.0	3.0	.8	.4	.2	.4	1.5	1.5	3.0
28	19	10	39	5.0	2.9	.8	.5	.1	.3	1.5	1.5	3.0
29	18	.....	28	6.0	2.8	.8	.5	.1	.2	1.5	1.5	3.0
30	17	.....	27	6.0	2.5	.8	.5	.1	.2	1.5	1.5	3.0
31	16	.....	26	.....	2.3	.....	.5	.1	.....	1.5	.....	3.0

NOTE.—Daily discharges determined from rating curves applicable as follows: Jan. 1 to Feb. 14, 1910, poorly defined; Feb. 15 to Mar. 2, indirect method for shifting channels; Mar. 3 to Mar. 12, poorly defined; Mar. 13 to Apr. 25, indirect method for shifting channels; Apr. 26 to Oct. 15, fairly well defined; Oct. 16 to Dec. 31, indirect method for shifting channels.

Monthly discharge of Sweetwater River near Descanso, Cal., for 1910.

[Drainage area, 40 square miles.]

Month.	Discharge in second-feet.				Run-on.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	479	16	65.1	1.63	1.88	4,000	C.
February	22	10	13.9	.348	.36	772	C.
March	39	7	12.9	.322	.37	793	C.
April	25	5	11.6	.290	.32	690	C.
May	7	2.3	4.66	.116	.13	287	C.
June	2.3	.8	1.39	.035	.04	83	C.
July	.9	.4	.63	.016	.02	39	C.
August	.4	.1	.25	.006	.007	15	C.
September	.4	.0	.208	.005	.006	12	C.
October	3	.05	.955	.024	.03	59	C.
November	4	1	1.51	.038	.04	90	C.
December	5	2	2.66	.066	.08	164	C.
The year	479	.0	9.68	.242	3.28	7,000	

SAN DIEGO RIVER BASIN.

SAN DIEGO RIVER AND FLUME NEAR LAKESIDE, CAL.

San Diego River rises in the Cuyamaca Mountains on the western slope of the Coast Range and flows in a southwesterly direction, discharging into Pacific Ocean through False Bay at the northern boundary of San Diego City. Its length is about 50 miles, half of which lies in the mountains above the town of Lakeside. The San Diego basin lies directly south of the Santa Ysabel basin and north of Sweetwater River basin.

The San Diego has several small tributaries, the most important being Coleman, Cedar, Boulder, South Fork, and Chocolate creeks, all of which enter from the east and south above Lakeside. San Vicente Creek, the only important tributary from the north, enters the river at Lakeside.

The gaging station, which is located about 1 mile above the San Diego, Cuyamaca & Eastern Railway station, at crossing of the road from Lakeside to Padre Barona Valley, on the El Cajon land grant, was established December 3, 1905.

Chocolate Creek enters the river from the south 7 miles above, and San Vicente Creek from the north 1 mile below the gaging station. The drainage area at this point is 208 square miles.

The San Diego flume diverts water from the river at a point one-half mile below the junction of Boulder Creek and about 15 miles above the gaging station. This flume diverts all the low flow of the river and a sufficient amount of the winter flow to fill La Mesa storage reservoir. The present capacity of the flume is about 16 second-feet. In addition, there are five pumping plants, located from 1 to 3 miles above the station, that obtain water for irrigation from wells along the banks of the stream. Their capacity ranges from about one-half to 2½ second-feet. There are several similar pumping plants below the station.

The staff gage is in three sections on the left bank at the cable from which discharge measurements are made. The gage datum has remained unchanged since the station was established.

The gaging station on the San Diego flume is located at the trestle crossing at Los Coches Creek, 3½ miles southeast of Lakeside. The gage heights are furnished by the San Diego Flume Co.

The conditions at the river station are extremely bad for procuring accurate estimates of discharge. The channel is wide and is composed of sand, which is constantly shifting and changing the position of the stream. Many discharge measurements are necessary to procure reliable estimates of discharge.

The discharge for 1910 was determined by the indirect method for shifting channels and from rating tables covering short periods of time. The record may be considered fair.

Discharge measurements of San Diego River near Lakeside, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 12	W. V. Hardy	61	58	3.50	152
21	do	61	42	3.33	100
28	do	61	33	3.22	65
Feb. 12	do	51	21	3.14	38
18	do	52	23	3.17	36
24	do	43	23	3.18	44
28	do	38	21	3.15	36
Mar. 5	do	42	14	3.13	22
11	do	20	11	3.12	18
23	do	29	13	3.13	20
Apr. 1	do	61	33	3.37	68
3	do	61	29	3.28	54
16	do	56	20	3.20	30
25	do	6	2.4	3.07	2.7
27	do	4	1.2	3.02	1.1
May 6	do	5	2.0	3.06	2.6
17	do	3	.9	3.02	.82
19	do	1	.3	3.00	.33
June 2	do	1	.3	2.97	.31
6	do	1	.3	2.95	.23
Nov. 19	do				0

Daily gage height, in feet, of San Diego River near Lakeside, Cal., for 1910.

[J. H. Beadle, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	4.02	3.23	3.20	3.36	3.08	3.00	2.98	16	3.70	3.15	3.16	3.20	3.02	2.98	.....
2	4.15	3.30	3.18	3.33	3.08	3.00	2.98	17	3.95	3.12	3.10	3.18	3.01	2.97	.....
3	3.95	3.25	3.15	3.38	3.08	3.00	3.00	18	3.55	3.17	3.11	3.14	3.02	2.98	.....
4	3.78	3.20	3.12	3.30	3.07	2.95	3.00	19	3.45	3.20	3.11	3.16	3.03	2.96	.....
5	3.65	3.12	3.13	3.29	3.10	2.95	3.00	20	3.40	3.22	3.13	3.15	3.01	2.96	.....
6	3.52	3.20	3.12	3.27	3.06	2.95	3.00	21	3.35	3.45	3.11	3.12	3.02	2.96	.....
7	3.48	3.18	3.18	3.30	3.07	2.97	2.96	22	3.30	3.22	3.14	3.11	3.02	2.98	.....
8	3.48	3.20	3.18	3.27	3.06	3.00	2.95	23	3.25	3.19	3.15	3.11	3.01	2.98	.....
9	3.40	3.20	3.19	3.20	3.05	3.00	.....	24	3.22	3.18	3.14	3.08	3.02	2.98	.....
10	3.50	3.20	3.15	3.18	3.04	2.98	.....	25	3.21	3.19	3.13	3.07	3.03	2.98	.....
11	3.45	3.15	3.12	3.20	3.04	2.95	.....	26	3.28	3.20	3.25	3.09	3.03	2.98	.....
12	3.50	3.15	3.17	3.29	3.03	2.90	.....	27	3.25	3.15	3.30	3.05	3.03	3.00	.....
13	3.40	3.11	3.11	3.40	3.03	2.90	.....	28	3.22	3.17	3.55	3.03	3.03	2.98	.....
14	3.35	3.11	3.08	3.30	3.03	2.98	.....	29	3.23	.....	3.75	3.02	3.02	2.98	.....
15	3.35	3.11	3.09	3.25	3.00	2.97	.....	30	3.20	.....	3.70	3.03	3.01	3.00	.....
								31	3.18	.....	3.50	.....	3.01	.....	.....

NOTE.—No water running July 9 to Dec. 31.

Daily discharge, in second-feet, of San Diego River near Lakeside, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1....	391	65	46	69	3.6	0.6	0.4	16....	238	35	25	30	1.0	0.4	.....
2....	462	86	38	62	3.6	.6	.4	17....	355	27	15	26	.8	.3	.....
3....	355	70	30	74	3.6	.6	.6	18....	176	36	17	18	1.0	.4	.....
4....	273	56	22	54	3.0	.2	.6	19....	138	44	17	22	1.2	.3	.....
5....	217	36	22	52	5.0	.2	.6	20....	120	50	20	20	.8	.3	.....
6....	164	56	20	47	2.4	.2	.6	21....	102	124	17	14	1.0	.3	.....
7....	149	50	30	54	3.0	.3	.3	22....	86	52	22	11	1.0	.4	.....
8....	149	56	32	47	2.4	.6	.2	23....	71	46	23	11	.8	.4	.....
9....	120	56	32	32	2.0	.6	.....	24....	62	44	22	5.0	1.0	.4	.....
10....	156	56	24	29	1.6	.4	.....	25....	59	46	20	2.7	1.2	.4	.....
11....	138	43	18	32	1.6	.2	.....	26....	80	49	43	4.3	1.2	.4	.....
12....	156	41	27	52	1.2	.1	.....	27....	70	37	54	2.0	1.2	.6	.....
13....	120	30	17	80	1.2	.1	.....	28....	62	39	125	1.2	1.2	.4	.....
14....	102	29	12	54	1.2	.4	.....	29....	65	.....	194	1.0	1.0	.4	.....
15....	102	27	14	43	.6	.3	.....	30....	56	.....	176	1.2	.8	.6	.....
								31....	50	.....	109	.....	.8	.....	.....

NOTE.—No flow after July 8. Daily discharge determined from rating curves applicable as follows: Jan. 1 to Feb. 12, fairly well defined between 30 and 180 second-feet; Feb. 13 to Mar. 11, indirect method for shifting channels; Mar. 12 to Apr. 16, fairly well defined between 16 and 80 second-feet; Apr. 17 to 24, indirect method for shifting channels; Apr. 25 to July 8, fairly well defined.

Monthly discharge of San Diego River near Lakeside, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	462	50	156	9,590	B.
February	124	27	49.5	2,750	B.
March	194	12	41.4	2,550	B.
April	80	1.0	31.7	1,890	B.
May	5.0	.6	1.68	103	B.
June	.6	.1	.38	23	C.
July	.6	.0	.12	7	C.
The period	.....	.....	.....	16,900	

NOTE.—No flow from July 9 to Dec. 31.

Discharge measurements of San Diego flume near Lakeside, Cal., in 1909–1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1909.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 25	W. V. Hardy	5.9	3.1	0.52	6.3
Mar. 23	.....do	5.9	3.0	.51	6.2
25	.....do	5.9	4.4	.74	12.4
Apr. 6	.....do	5.9	2.5	.42	4.5
19	Clapp and Hardy	5.9	4.5	.74	11.5
May 25	W. V. Hardy	5.9	4.7	.80	11.6
1910.					
Jan. 22	W. V. Hardy	5.9	2.2	0.35	3.3
Feb. 12	.....do	5.9	3.2	.53	7.8
Mar. 4	.....do	5.9	3.4	.56	8.8
11	.....do	5.9	3.9	.63	9.8
Apr. 1	.....do	5.9	4.2	.68	11
3	.....do	5.9	3.1	.51	6.8
25	.....do	5.9	4.3	.72	12
27	.....do	5.9	4.5	.76	12
May 6	.....do	5.9	4.3	.72	11
23	.....do	5.9	3.4	.57	8.0
June 3	.....do	5.9	4.0	.66	9.5
26	.....do	5.9	3.8	.64	8.1
Nov. 18	.....do	5.9	1.8	.30	2.7

NOTE.—These measurements in 1909 were omitted from Water-Supply Paper 271.

Daily gage height, in feet, of San Diego flume near Lakeside, Cal., for 1910.

[San Diego Flume Co., observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.53	0.00	0.00	0.54	0.76	0.60	0.61	0.52	0.60	0.62	0.48	0.40
2	.37	.00	.16	.44	.75	.62	.61	.57	.65	.62	.49	.39
3	.30	.00	.00	.45	.73	.65	.59	.60	.69	.67	.48	.43
4	.26	.00	.55	.29	.70	.66	.58	.60	.64	.70	.49	.51
5	.23	.14	.53	.26	.70	.65	.57	.56	.65	.61	.43	.57
6	.06	.40	.43	.25	.72	.64	.65	.59	.43	.56	.28	.52
7	.00	.00	.00	.34	.72	.64	.61	.58	.21	.57	.42	.47
8	.00	.00	.00	.52	.69	.60	.56	.56	.60	.61	.53	.35
9	.10	.04	.00	.58	.65	.58	.55	.57	.62	.67	.56	.50
10	.32	.00	.39	.40	.64	.51	.51	.59	.67	.66	.53	.47
11	.44	.16	.63	.29	.64	.50	.54	.57	.57	.74	.55	.45
12	.41	.35	.63	.29	.62	.49	.56	.58	.58	.64	.54	.42
13	.40	.57	.60	.33	.60	.58	.57	.61	.63	.65	.48	.44
14	.39	.34	.26	.45	.61	.62	.60	.57	.65	.65	.47	.43
15	.44	.32	.05	.60	.67	.61	.59	.58	.58	.59	.33	.43
16	.39	.24	.41	.68	.65	.60	.59	.60	.60	.31	.12	.44
17	.41	.14	.58	.67	.58	.59	.56	.61	.58	.00	.10	.46
18	.36	.00	.58	.67	.56	.57	.54	.61	.59	.16	.32	.46
19	.33	.00	.55	.75	.57	.57	.56	.62	.58	.46	.43	.48
20	.33	.00	.55	.82	.59	.56	.57	.59	.59	.46	.46	.57
21	.31	.21	.55	.80	.64	.57	.56	.57	.68	.56	.45	.48
22	.32	.41	.54	.76	.60	.59	.57	.59	.67	.60	.45	.29
23	.28	.35	.57	.75	.57	.59	.58	.58	.64	.44	.41	.25
24	.30	.24	.60	.72	.54	.59	.55	.59	.63	.40	.34	.38
25	.23	.00	.54	.74	.52	.61	.58	.52	.58	.53	.33	.45
26	.00	.47	.57	.76	.55	.60	.61	.53	.59	.55	.44	.48
27	.00	.46	.39	.76	.55	.59	.60	.53	.62	.52	.48	.42
28	.00	.15	.11	.77	.56	.59	.54	.46	.61	.48	.42	.40
29	.53	.....	.27	.76	.56	.58	.51	.46	.58	.50	.42	.42
30	.28	.....	.00	.56	.59	.57	.49	.54	.58	.47	.41	.43
31	.00	.....	.19	.....	64	.....	.51	.59	.....	.49	.....	.34

NOTE.—Gage readings represent the depth of water in the flume.

Daily discharge, in second-feet, of San Diego flume near Lakeside, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.9	0.0	0.0	7.1	12.5	8.5	8.7	6.7	8.5	9.0	5.8	4.2
2	3.7	.0	.9	5.0	12.3	9.0	8.7	7.8	9.7	9.0	6.0	4.0
3	2.5	.0	.0	5.2	11.7	9.7	8.3	8.5	10.7	10.2	5.8	4.8
4	2.0	.0	7.4	2.4	10.9	9.9	8.0	8.5	9.5	10.9	6.0	6.4
5	1.6	.7	6.9	2.0	10.9	9.7	7.8	7.6	9.7	8.7	4.8	7.8
6	.2	4.2	4.8	1.8	11.4	9.5	9.7	8.3	4.8	7.6	2.2	6.7
7	.0	.0	.0	3.2	11.4	9.5	8.7	8.0	1.3	7.8	4.6	5.6
8	.0	.0	.0	6.7	10.7	8.5	7.6	7.6	8.5	8.7	6.9	3.3
9	.4	.2	.0	8.0	9.7	8.0	7.4	7.8	9.0	10.2	7.6	6.2
10	2.8	.0	4.0	4.2	9.5	6.4	6.4	8.3	10.2	9.9	6.9	5.6
11	5.0	.9	9.2	2.4	9.5	6.2	7.1	7.8	7.8	12.0	7.4	5.2
12	4.4	3.3	9.2	2.4	9.0	6.0	7.6	8.0	8.0	9.5	7.1	4.6
13	4.2	7.8	8.5	3.0	8.5	8.0	7.8	8.7	9.2	9.7	5.8	5.0
14	4.0	3.2	2.0	5.2	8.7	9.0	8.5	7.8	9.7	9.7	5.6	4.8
15	5.0	2.8	.2	8.5	10.2	8.7	8.3	8.0	8.0	8.3	3.0	4.8
16	4.0	1.7	4.4	10.4	9.7	8.5	8.3	8.5	8.5	2.7	.6	5.0
17	4.4	.7	8.0	10.2	8.0	8.3	7.6	8.7	8.0	.0	.4	5.4
18	3.5	.0	8.0	10.2	7.6	7.8	7.1	8.7	8.3	.9	2.8	5.4
19	3.0	.0	7.4	12.3	7.8	7.8	7.6	9.0	8.0	5.4	4.8	5.8
20	3.0	.0	7.4	14.2	8.3	7.6	7.8	8.3	8.3	5.4	5.4	7.8
21	2.7	1.3	7.4	13.6	9.5	7.8	7.6	7.8	10.4	7.6	5.2	5.8
22	2.8	4.4	7.1	12.5	8.5	8.3	7.8	8.3	10.2	8.5	5.2	2.3
23	2.2	3.3	7.8	12.3	7.8	8.3	8.0	8.0	9.5	5.0	4.4	1.8
24	2.5	1.7	8.5	11.4	7.1	8.3	7.4	8.3	9.2	4.2	3.2	3.9
25	1.6	.0	7.1	12.0	6.7	8.7	8.0	6.7	8.0	6.9	3.0	5.2
26	.0	5.6	7.8	12.5	7.4	8.5	8.7	6.9	8.3	7.4	5.0	5.8
27	.0	5.4	4.0	12.5	7.4	8.3	8.5	6.9	9.0	6.7	5.8	4.6
28	.0	.8	.5	12.8	7.6	8.3	7.1	5.4	8.7	5.8	4.6	4.2
29	6.9	.....	2.1	12.5	7.6	8.0	6.4	5.4	8.0	6.2	4.6	4.6
30	2.2	.....	.0	7.6	8.3	7.8	6.0	7.1	8.0	5.6	4.4	4.8
31	.0	.....	1.1	.....	9.5	.....	6.4	8.3	.....	6.0	.....	3.2

NOTE.—Daily discharge determined from a fairly well-defined discharge rating curve.

Monthly discharge of San Diego flume near Lakeside, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	6.9	0.0	2.63	162	B.
February	7.8	.0	1.71	95	C.
March	9.2	.0	4.57	281	C.
April	14.2	1.8	8.14	484	B.
May	12.5	6.7	9.22	567	B.
June	9.9	6.0	8.30	494	B.
July	9.7	6.0	7.77	478	B.
August	9.0	5.4	7.80	480	B.
September	10.7	1.3	8.50	506	B.
October	12.0	.0	7.27	447	B.
November	7.6	.4	4.83	287	B.
December	7.8	1.8	4.99	307	B.
The year	14.2	.0	6.34	4,590	

Daily discharge, in second-feet, of San Diego River and flume near Lakeside, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	398	65	46	76	16	9	9	6.7	8.5	9.0	5.8	4.2
2	466	86	39	67	16	10	9	7.8	9.7	9.0	6.0	4.0
3	358	70	30	79	15	10	9	8.5	10.7	10.2	5.8	4.8
4	275	56	29	56	14	10	9	8.5	9.5	10.9	6.0	6.4
5	219	37	29	54	16	10	8	7.6	9.7	8.7	4.8	7.8
6	164	60	25	49	14	10	10	8.3	4.8	7.6	2.2	6.7
7	149	50	30	57	14	10	9	8.0	1.3	7.8	4.6	5.6
8	149	56	32	54	13	9	8	7.6	8.5	8.7	6.9	3.3
9	120	56	32	40	12	9	7.4	7.8	9.0	10.2	7.6	6.2
10	159	56	28	33	11	7	6.4	8.3	10.2	9.9	6.9	5.6
11	143	44	27	34	11	6	7.1	7.8	7.8	12.0	7.4	5.2
12	160	44	36	54	10	6	7.6	8.0	8.0	9.5	7.1	4.6
13	124	38	25	83	10	8	7.8	8.7	9.2	9.7	5.8	5.0
14	106	32	14	59	10	9	8.5	7.8	9.7	9.7	5.6	4.8
15	107	30	14	52	11	9	8.3	8.0	8.0	8.3	3.0	4.8
16	242	37	29	40	11	9	8.3	8.5	8.5	2.7	.6	5.0
17	359	28	23	36	9	9	7.6	8.7	8.0	.0	.4	5.4
18	180	36	25	28	9	8	7.1	8.7	8.3	.9	2.8	5.4
19	141	44	24	34	9	8	7.6	9.0	8.0	5.4	4.8	5.8
20	123	50	27	34	9	8	7.8	8.3	8.3	5.4	5.4	7.8
21	105	125	24	28	10	8	7.6	7.8	10.4	7.6	5.2	5.8
22	89	56	29	24	10	9	7.8	8.3	10.2	8.5	5.2	2.3
23	73	49	31	23	9	9	8.0	8.0	9.5	5.0	4.4	1.8
24	64	46	30	16	8	9	7.4	5.3	9.2	4.2	3.2	3.9
25	61	46	27	15	8	9	8.0	6.7	8.0	6.9	3.0	5.2
26	80	55	51	17	9	9	8.7	6.9	8.3	7.4	5.0	5.8
27	70	42	58	14	9	9	8.5	6.9	9.0	6.7	5.8	4.6
28	62	40	126	14	9	9	7.1	5.4	8.7	5.8	4.6	4.2
29	72	.....	196	14	9	8	6.4	5.4	8.0	6.2	4.6	4.6
30	58	.....	176	9	9	8	6.0	7.1	8.0	5.6	4.4	4.8
31	50	.....	110	.....	10	.....	6.4	8.3	.....	6.0	.....	3.2

Monthly discharge of San Diego River and flume near Lakeside, Cal., for 1910.

[Drainage area, 208 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	466	50	159	0.764	0.88	9,780
February	125	28	51.2	.246	.26	2,840
March	196	14	46.0	.221	.25	2,830
April	83	9	39.8	.191	.21	2,370
May	16	8	10.9	.052	.06	670
June	10	6	8.68	.042	.05	516
July	10	6	7.89	.038	.04	485
August	9	5.4	7.80	.038	.04	480
September	10.7	1.3	8.50	.041	.05	506
October	12	.0	7.27	.035	.04	447
November	7.6	.4	4.83	.023	.03	287
December	7.8	1.8	4.99	.024	.03	307
The year	466	.0	29.7	.143	1.94	21,500

NOTE.—No flow in the river from July 9 to Dec. 31.

SAN DIEGUITO RIVER BASIN.[1]

SANTA YSABEL CREEK NEAR ESCONDIDO, CAL.

San Dieguito River, or Santa Ysabel Creek, as it is known from its source to the San Pasqual Valley, rises in the Volcan Mountains on the western slope of the Coast Range and flows westward through San Pasqual Valley, below which it takes its true name, and empties into the Pacific Ocean midway between Oceanside and San Diego. Its length is 50 miles, and the maximum width of the drainage basin about 15 miles. The total drainage area is approximately 340 square miles. It lies south of San Luis River and north of the San Diego River basin.

Numerous small tributaries enter San Ysabel Creek between its source and San Pasqual Valley, the most important being Black Canyon and Temescal creeks from the north and Santa Maria Creek from the south. Above San Pasqual Valley the creek maintains a light flow throughout the year, but below that point the channel is dry during the summer months.

The gaging station, which is located below the mouth of the narrow canyon at the upper end of the San Pasqual Valley, in the SW. ¼ sec. 31, T. 12 S., R. 1 E., 10 miles southeast of Escondido, was established Dec. 17, 1905.

Roden Canyon Creek and Temescal Creek, tributaries from the north, enter the Santa Ysabel Creek 1½ and 5 miles, respectively, above the gaging station. Santa Maria Creek enters from the south 4 miles below the gaging station.

[1] Called Bernardo River in previous reports.

No water is diverted from this stream above the gaging station. Within half a mile below the station, in the San Pasqual Valley, are two small irrigation canals. A third canal, with a capacity of about 45 second-feet, heads about 1 mile below the station, and about 2 miles below is a fourth, with a capacity of about 25 second-feet.

The gage is an inclined staff on the left bank. The datum of the gage has not been changed since the station was established.

At high stages discharge measurements are made from a cable at the gage.

The conditions for obtaining accurate discharge data at this station are extremely poor. The channel is composed of shifting sand which scours out at high stages of the stream and immediately fills in again as the flow decreases. Frequent measurements of discharge are necessary to procure reliable estimates.

The discharge for 1910 was estimated by the indirect method for shifting channels and from rating curves covering short periods of time. The record is approximate.

Discharge measurements of Santa Ysabel Creek near Escondido, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 11	W. V. Hardy	74	40	0.60	105
31	do	55	33	.51	66
Feb. 11	do	40	21	.57	44
19	do	30	16	.60	46
22	do	45	24	.67	53
23	do	45	27	.69	56
Mar. 6	do	20	14	.72	31
10	do	30	16	.76	34
22	do	35	18	.80	39
31	do	60	30	.96	57
Apr. 4	do	65	26	.94	42
8	do	55	24	.90	42
15	do	51	21	.90	34
28	do	18	10	.86	18
May 5	do	25	12	.87	20
16	do	15	6	.84	10
30	do	6	2.6	.75	4.2
June 2	do	12	4.2	.79	5.7
8	do	10	3.0	.77	3.3
30	do	5	1.2	.74	1.3
Nov. 25	do	8	2.4	.80	2.9

NOTE.—Measurements made by wading in the vicinity of the gage.

Daily gage height, in feet, of Santa Ysabel Creek near Escondido, Cal., for 1910.

[S. F. Potts, observer.]

Day.	Jan.	Feb	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	[a]2.40	0.52	0.73	0.94	0.88	0.78	0.70	16	0.90	0.60	0.75	0.98	0.82	0.78	.....
2	1.60	.52	.72	.94	.87	.79	.66	17	.70	.58	.77	.98	.82	.76	.....
3	1.42	.53	.72	.94	.86	.79	.64	18	.60	.60	.77	.98	.81	.76	.....
4	1.20	.53	.71	.94	.85	.79	.63	19	.58	.70	.77	.97	.80	.77	.....
5	.95	.53	.71	.93	.86	.79	.62	20	.55	.80	.78	.95	.80	.75	.....
6	.70	.52	.72	.93	.85	.79	.64	21	.53	.75	.78	.92	80	.73	.....
7	.68	.51	.72	.92	.84	.79	.63	22	.52	.73	.79	.90	82	.74	.....
8	.68	.52	.71	.92	.83	.79	.62	23	.52	.72	.80	.84	.81	.74	.....
9	.66	.52	.72	.92	.82	.77	.....	24	.52	.73	.80	.86	.81	.73	.....
10	.64	.52	.72	.91	.82	.76	.....	25	.52	.72	.80	.87	.81	.71	.....
11	.60	.57	.73	.92	.83	.74	.....	26	.52	.72	.81	.88	.80	.70	.....
12	.60	.53	.73	1.03	.83	.75	.....	27	.52	.75	.90	.89	.79	.68	.....
13	.60	.54	.74	1.02	.82	.76	.....	28	.52	.74	1.30	.86	.76	.67	.....
14	.57	.55	.73	1.01	.82	.77	.....	29	.52	.....	1.09	.87	.77	.66	.....
15	.60	.56	.74	1.00	.82	.77	.....	30	.52	.....	.94	.89	.77	.70	.....
								31	.52	.....	.97	.....	.....	.....	.....

[a] Maximum 2.7 feet; corresponding discharge, 3,950 second-feet.

NOTE.—Creek dry from July 9 to Dec. 31.

Daily discharge, in second-feet, of Santa Ysabel Creek near Escondido, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	3,100	64	45	50	19	5	1	16	340	45	37	49	10	2	.....
2	1,320	62	41	47	19	6	1	17	170	46	37	48	10	2	.....
3	1,020	60	39	44	20	5	.5	18	105	46	37	47	9	2	.....
4	690	58	35	42	20	5	.5	19	100	46	38	45	8	2	.....
5	390	56	33	42	20	4	.5	20	80	48	38	40	7	2	.....
6	170	54	31	42	19	4	.5	21	70	50	38	33	7	2	.....
7	155	52	31	42	18	3	.5	22	65	53	39	29	7	2	.....
8	155	50	32	42	17	3	.5	23	65	56	40	19	6	1	.....
9	140	48	33	45	16	3	.....	24	65	58	40	21	6	1	.....
10	125	46	34	42	15	3	.....	25	65	54	40	22	6	1	.....
11	105	44	35	42	14	3	.....	26	65	52	42	22	5	1	.....
12	105	44	35	62	13	3	.....	27	65	53	51	23	5	1	.....
13	105	44	36	60	12	3	.....	28	65	49	90	18	4	1	.....
14	90	45	36	62	11	3	.....	29	65	.....	70	18	4	1	.....
15	105	45	36	56	10	3	.....	30	65	.....	54	18	4	1	.....
								31	66	.....	57	.....	4	.....	.....

NOTE.—Creek dry from July 9 to Dec. 31. Daily discharge determined by the indirect method for shifting channels and from rating curves covering short periods of time. The values are, however, only approximate.

Monthly discharge of Santa Ysabel Creek near Escondido, Cal., for 1910.

[Drainage area, 128 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	3,100	65	300	2.34	.270	18,400
February	64	44	51.0	.398	.41	2,830
March	90	31	41.3	.323	.37	2,540
April	62	18	39.1	.305	.34	2,330
May	20	4	11.4	.089	.10	701
June	6	1	2.6	.020	.02	155
July	1	0	.16	.001	.001	10
The Period						27,000

NOTE.—No flow from July 9 to Dec. 31. On account of the unfavorable conditions at this station these estimates are only approximate.

SAN LUIS REY RIVER BASIN.

SAN LUIS REY RIVER NEAR PALA, CAL.

San Luis Rey River drains an area about 575 square miles in extent lying wholly in the northern part of San Diego County and extending from the crest of the Coast Range to the Pacific Ocean, a distance of 65 miles, with a maximum width of about 16 miles.

The river is formed by many small streams which have their sources in the higher elevations of the Coast Range and come together at the lower or west end of what is known as Warner's Valley. Below this point the river flows for a distance of 10 miles through a deep, narrow canyon with a heavy grade, then over a sandy and gravelly bed with light grade for some 40 miles, finally discharging into the Pacific Ocean at Oceanside.

This station, which is located at the road crossing to Sickler's mill, 4 miles above Pala, in the NW. $\frac{1}{4}$ sec. 31, T. 9 S., R. 1 W., was established October 9, 1903.

No tributaries enter the river near the gaging station. Water is diverted from the river during the winter and spring months at a point in the rough canyon about 11 miles above the station to a storage reservoir, and is used during the summer period for irrigation and municipal supply at Esconiddo and the surrounding country. About 3 miles below this point there is a diversion for irrigation on the Rincon Indian Reservation. One mile above the station a small amount is diverted for use on the Sickler ranch. The only diversion below the station is that used for irrigation on the Pala Indian Reservation. There are several pumping plants between Pala and the mouth, which obtain water from wells along the banks of the stream. The drainage area above the station is 318 square miles.

The staff gage is in two sections on the left bank at the cable from which discharge measurements are made. The datum of the gage was lowered 4.66 feet on November 13, 1906.

Conditions for obtaining accurate discharge data are poor. The channel is wide, is composed of sand, gravel, and bowlders, and is subject to constant change. The current is swift at flood stages.

The estimates of discharge were prepared from rating curves covering short periods of time and by interpolation on the days when the gage was not read. The record may be considered good.

Discharge measurements of San Luis Rey River near Pala, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 8	W. V. Hardy	62	50	7.55	164
Feb. 3	....do	54	32	6.93	102
20	....do	53	40	7.10	141
21	....do	53	32	6.85	109
21	....do	48	31	6.78	103
Mar. 8	....do	43	20	6.40	43
9	....do	43	19	6.37	42
29	....do	90	62	7.30	177
Apr. 11	....do	43	23	6.54	60
12	....do	45	29	6.74	83
12	....do	45	34	6.80	95
13	....do	45	28	6.70	76
13	....do	45	26	6.60	64
May 3	....do	24	11	6.04	18
4	....do	24	11	6.07	20
11	....do	12	6	5.81	11
31	....do	13	5.1	5.72	8.4
June 28	....do	10	3.8	5.67	5.7
Sept. 20	C. C. Jacob	5.1	2.5	5.62	3.9
Nov. 23	W. V. Hardy	12	4.6	5.72	6.9

NOTE.—All measurements except Jan. 8 made by wading in the vicinity of the gage.

Daily gage height, in feet, of San Luis Rey River near Pala, Cal., for 1910.

[L. S. Salmons, observer.]

	Jan.	Feb.	Mar.	Apr.	May.	June.		Jan.	Feb.	Mar.	Apr.	May.	June.
1	[a]11.49	7.10	6.70	6.72	6.08	5.71	16	8.80	.....	6.34	6.48	5.80	5.66
2	9.48	7.00	6.70	6.70	6.07	5.70	17	8.60	.....	6.40	6.45	5.79	5.66
3	8.40	6.93	6.55	6.70	6.05	5.70	18	8.56	.....	6.60	6.40	5.79	5.66
4	7.60	6.92	6.62	6.70	5.98	5.70	19	8.40	.....	6.48	6.34	5.78	5.66
5	7.58	6.90	6.55	6.70	5.90	5.68	20	8.35	6.67	6.35	6.35	5.77	5.66
6	7.55	6.82	6.60	6.68	5.94	5.69	21	8.26	6.68	6.30	6.26	5.77	5.67
7	7.56	.....	.....	6.62	5.90	5.74	22	8.15	.....	6.42	6.21	5.76	5.67
8	7.55	.....	.....	6.60	5.86	5.67	23	8.00	.....	.....	6.17	5.76	5.67
9	7.55	.....	.....	6.58	5.85	5.66	24	7.96	6.60	.....	6.19	5.75	5.67
10	7.55	.....	.....	6.55	5.80	5.65	25	7.84	6.68	.....	6.12	5.75	5.67
11	7.68	.....	.....	6.54	5.81	5.64	26	7.72	.....	6.60	6.13	5.74	5.67
12	7.60	.....	.....	6.77	5.81	5.66	27	7.60	6.65	6.78	6.12	5.74	5.67
13	7.55	.....	6.32	6.65	5.80	5.66	28	7.58	6.70	7.73	6.11	5.73	5.67
14	7.50	6.37	6.41	6.54	5.80	5.66	29	7.40	.....	7.38	6.11	5.73	5.67
15	7.58	.....	.....	6.51	5.80	5.66	30	7.32	.....	7.12	6.10	5.72	5.67
							31	7.22	.....	6.85	.....	5.72	.....

[a] Maximum, 12.4 feet; corresponding discharge, 5,400 second-feet.

Daily discharge, in second-feet, of San Luis Rey River near Pala, Cal., for 1910.

	Jan.	Feb.	Mar.	Apr.	May.	June.		Jan.	Feb.	Mar.	Apr.	May.	June
1	3,770	100	79	82	20	63	16	695	52	39	52	9	5.2
2	1,200	85	79	79	20	6	17	580	58	44	49	8.7	5.2
3	485	78	60	79	18	6	18	560	63	66	44	8.7	5.2
4	205	77	69	79	15	6	19	485	69	52	39	8.4	5.2
5	200	75	60	79	12	5.6	20	462	75	40	40	8.1	5.2
6	192	71	66	76	14	5.8	21	422	76	35	32	8.1	5.4
7	195	67	62	69	12	7.2	22	375	73	46	28	7.8	5.4
8	192	63	58	66	11	5.4	23	320	69	51	25	7.8	5.4
9	192	60	54	64	10	5.2	24	308	66	56	26	7.5	5.4
10	192	56	50	60	9	5.0	25	272	76	61	22	7.5	5.4
11	225	52	45	59	9.3	4.8	26	236	74	66	23	7.2	5.4
12	205	49	41	89	9.3	5.2	27	205	72	90	22	7.2	5.4
13	192	45	37	72	9	5.2	28	200	79	259	22	6.9	5.4
14	180	41	45	59	9	5.2	29	155	.....	191	22	6.9	5.4
15	200	47	42	55	9	5.2	30	139	.....	145	21	6.6	5.4
							31	119	.....	101	.....	6.6	.....

NOTE.—Daily discharge determined from rating curves applicable as follows: Jan. 1 to Feb. 6, fairly well defined; Feb. 14 to June 30, well defined, below 200 second-feet. Discharge interpolated for days on which gage was not read.

Monthly discharge of San Luis Rey River near Pala, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	3,770	119	431	26,500	C.
February	100	41	66.7	3,700	B.
March	259	35	70.6	4,340	B.
April	89	21	51.1	3,040	B.
May	20	6.6	9.99	614	B.
June	7.2	4.8	5.47	325	B.
The period				38,500	

SANTA ANA RIVER BASIN.

SANTA ANA RIVER AND MENTONE POWER CO.'S CANAL NEAR MENTONE, CAL.

Of the three important streams—Santa Ana, San Gabriel, and Los Angeles rivers—that traverse the valley of southern California, the Santa Ana is the most important. Its drainage basin, lying south of the San Bernardino Mountains and the Sierra Madre and taking waters from their southern slopes, is the most eastern and comprises by far the largest area, including the northern part of Orange County, the northwestern part of Riverside County, and the southwestern part of San Bernardino County. Of the total drainage area, covering between 1,800 and 1,900 square miles, about two-thirds are in the valley, but only a few hundred yield much run-off.

The Santa Ana rises in the heart of the San Bernardino Mountains, about 30 miles east of Highland, and flows westward for about 25 miles to the mouth of its upper canyon; thence southwestward across San Bernardino Valley, through the lower canyon in the

Santa Ana Mountains, and across the Coastal Plain to the Pacific Ocean at Newport Beach. Although the course of the stream measures about 100 miles, there is continuous surface flow from mountain to sea only during winter floods.

Many small streams from the southern slope of the San Bernardino Mountains and a few from the Sierra Madre west of the Cajon Pass flow toward the Santa Ana, but some of these discharge water to the main stream only in the flood seasons, the ordinary flow either being diverted or sinking into the sand and gravel of San Bernardino Valley. The principal tributaries are Bear, Alder, Mill, Lytle, and Chino creeks.

This station, which is located at the road crossing opposite Warm Spring Canyon, about three-fourths of a mile below the headworks of the Mentone Power Co.'s canal, 5 miles northeast of Mentone, in the SW. ¼ sec. 34, T. 1 N., R. 2 W., S. B. M., was established in June, 1896, and is about 2 miles below the mouth of Alder Creek.

Practically all the low-water flow is diverted above the station into the power canal. After leaving the power house this water is carried across the river to an irrigation canal. The flow in the canal is measured by a weir and is added to that at the station in order to obtain the total for the stream. The acquired water rights exceed the low-water flow.

The original staff gage was fastened to the left bank about 100 feet above the ford. The gage datum was lowered June 30, 1903. January 1, 1910, a severe flood carried away both gage and the car and cable from which discharge measurements were made and destroyed existing bench marks. The channel was completely changed. A new inclined staff gage was installed January 23, 1910, on the left bank, 50 feet above the former location, and set at a new datum. On February 25, 1910, however, it was found desirable to install a gage in the right channel, which carried most of the water. All gage heights prior to February 25 have been corrected to the datum of the west gage from a relation curve obtained from synchronous readings of the two gages.

Discharge measurements are made by wading at low and medium stages. As it is very difficult to reach the station at high stages the cable has not been replaced.

Conditions for obtaining accurate discharge data are fair. The stream has a rocky bed and is subject to slight change. At high stages the current is swift and it is difficult to get accurate gagings. The records are fairly satisfactory.

Discharge measurements of Santa Ana River and Mentone Power Co.'s canal near Mentone, Cal., in 1910.

Date.	Hydrographer.	Gage height,	Discharge.		
			River.	Canal.	Total.
		Feet.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*
Feb. 5	R. E. Haines	1.52	31	73	104
24	J. E. Stewart	1.40	19	66	85
Apr. 13	do	1.95	67	78	145
28	W. B. Clapp	1.30	11	78	89
June 7	do	1.21	6.9	72	79
July 20	J. E. Stewart	1.92	67	0	67
Sept. 14	W. B. Clapp	1.28	6.4	58	64

Daily gage height, in feet, of Santa Ana River near Mentone, Cal., for 1910.

[S. H. Rhodes, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.65	1.5	1.75	1.3	1.1	1.1	1.1	1.4	1.2	1.1	1.1
2	.....	1.65	1.5	2.0	1.3	1.1	1.1	1.1	1.4	1.2	1.1	1.1
3	.....	1.65	1.5	1.7	1.3	1.1	1.1	1.1	1.4	1.2	1.1	1.1
4	.....	1.75	1.5	1.5	1.3	1.1	1.1	1.1	1.2	1.2	1.1	1.1
5	.....	1.5	1.5	1.5	1.3	1.1	1.1	1.1	1.2	1.2	1.1	1.1
6	.....	1.75	1.5	1.4	1.3	1.1	1.1	1.1	1.2	1.2	1.1	1.1
7	.....	1.65	1.5	1.3	1.3	1.1	1.1	1.1	1.2	1.2	1.1	1.1
8	.....	1.65	1.5	1.3	1.3	1.1	1.1	1.1	1.2	1.2	1.1	1.1
9	.....	1.9	1.5	1.3	1.3	1.1	1.1	1.1	1.2	1.2	1.1	1.1
10	.....	2.25	1.5	1.3	1.3	1.1	1.1	1.1	1.3	1.2	1.1	1.1
11	.....	2.25	1.5	1.8	1.3	1.1	1.1	1.1	1.3	1.2	1.1	1.1
12	.....	2.25	1.5	1.9	1.3	1.1	1.1	1.1	1.4	1.4	1.1	1.1
13	.....	1.9	2.3	1.9	1.3	1.1	1.1	1.1	1.4	1.4	1.1	1.1
14	.....	1.9	2.3	1.9	1.3	1.2	1.1	1.1	1.3	1.4	1.1	1.1
15	.....	1.5	1.5	1.9	1.3	1.2	1.1	1.1	1.2	1.1	1.1	1.1
16	.....	1.5	1.5	1.9	1.3	1.2	2.1	1.1	1.4	1.1	1.1	1.1
17	.....	1.5	1.5	1.8	1.2	1.2	2.1	1.1	1.2	1.1	1.1	1.1
18	.....	1.5	1.5	1.8	1.3	1.2	2.0	1.1	1.2	1.1	1.1	1.1
19	.....	1.5	1.5	1.5	1.3	1.2	2.0	1.1	1.2	1.1	1.1	1.1
20	.....	1.5	1.5	1.4	1.3	1.2	1.9	1.1	1.2	1.1	1.1	1.1
21	.....	1.5	1.5	1.3	1.3	1.1	1.9	1.1	1.2	1.1	1.1	1.1
22	.....	1.5	1.5	1.3	1.3	1.1	1.9	1.1	1.2	1.1	1.1	1.1
23	2.25	1.5	1.5	1.2	1.3	1.1	1.5	1.1	1.2	1.1	1.1	1.1
24	1.9	1.5	1.5	1.2	1.3	1.1	1.4	1.1	1.2	1.1	1.1	1.1
25	2.6	1.5	1.7	1.3	1.3	1.1	1.3	1.1	1.2	1.1	1.1	1.1
26	2.4	1.5	1.7	1.2	1.1	1.1	1.2	1.1	1.2	1.1	1.1	1.1
27	2.25	1.5	1.5	1.2	1.1	1.1	1.2	1.1	1.2	1.1	1.1	1.1
28	2.25	1.5	1.5	1.2	1.1	1.1	1.1	1.1	1.2	1.1	1.1	1.1
29	2.25	.....	1.9	1.3	1.1	1.1	1.1	1.1	1.2	1.1	1.1	1.1
30	2.1	.....	1.75	1.3	1.1	1.1	1.1	1.1	1.2	1.1	1.1	1.1
31	2.1	.....	1.75	.....	1.1	.....	1.1	1	.....	1.1	.....	1.1

NOTE.—Old gage washed out Jan. 1, 1910, and a new gage installed on Jan. 23, 1910, at a new location and datum. See description.

Daily discharge, in second-feet, of Santa Ana River near Mentone, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	[a]8,500	38	26	48	11	2	2	2	15	4	2	2
2	.....	38	26	74	11	2	2	2	15	4	2	2
3	.....	38	26	43	11	2	2	2	15	4	2	2
4	.....	48	26	26	11	2	2	2	4	4	2	2
5	.....	26	26	26	11	2	2	2	4	4	2	2
6	.....	48	26	18	11	2	2	2	4	4	2	2
7	.....	38	26	11	11	2	2	2	4	4	2	2
8	.....	38	26	11	11	2	2	2	4	4	2	2
9	.....	63	26	11	11	2	2	2	4	4	2	2
10	.....	103	26	11	11	2	2	2	8	4	2	2
11	.....	103	26	53	11	2	2	2	8	4	2	2
12	.....	103	26	63	11	2	2	2	15	15	2	2
13	.....	63	109	63	11	2	2	2	15	15	2	2
14	.....	63	109	63	11	6	2	2	8	15	2	2
15	.....	26	26	63	11	6	2	2	4	2	2	2
16	.....	26	26	63	11	6	85	2	15	2	2	2
17	.....	26	26	53	6	6	85	2	4	2	2	2
18	.....	26	26	53	11	6	74	2	4	2	2	2
19	.....	26	26	26	11	6	74	2	4	2	2	2
20	.....	26	26	18	11	6	63	2	4	2	2	2
21	.....	26	26	11	11	2	63	2	4	2	2	2
22	.....	26	26	11	11	2	63	2	4	2	2	2
23	103	26	26	6	11	2	26	2	4	2	2	2
24	63	26	26	6	11	2	18	2	4	2	2	2
25	154	26	43	11	11	2	11	2	4	2	2	2
26	123	26	43	6	2	2	6	2	4	2	2	2
27	103	26	26	6	2	2	6	2	4	2	2	2
28	103	26	26	6	2	2	2	2	4	2	2	2
29	103	.....	63	11	2	2	2	2	4	2	2	2
30	85	.....	48	11	2	2	2	2	4	2	2	2
31	85	.....	48	.....	2	.....	2	33	.....	2	.....	2

[a] Computed from cross-section and slope data obtained after the high water.

NOTE.—Daily discharge determined from rating curves applicable as follows: Jan. 23 to Aug. 30, fairly well defined below 140 second-feet; Aug. 31 to Dec. 31, poorly defined.

No water in Mentone Power Co.'s canal Mar. 13 and 14 and July 16 to 22.

Monthly discharge of Santa Ana River near Mentone, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January (23–31)	154	63	102	1,820	B.
February	103	26	41.9	2,330	B.
March	109	26	35.1	2,160	B.
April	74	6	29.4	1,750	B.
May	11	2	9.1	560	B.
June	6	2	2.9	173	B.
July	85	2	19.7	1,210	B.
August	33	2	3.0	184	B.
September	15	4	6.6	393	C.
October	15	2	4.0	246	C.
November	2	2	2.0	119	C.
December	2	2	2.0	123	C.
The period	.....	.....	.....	11,100	

Daily discharge, in second-feet, of Mentone Power Co.'s canal near Mentone, Cal., for 1910.

[S. H. Rhodes, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	74	64	74	78	73	57	55	58	68	52	43
2	.....	72	66	66	78	72	58	57	58	59	46	42
3	.....	72	72	64	78	72	57	58	59	57	45	44
4	.....	73	74	72	78	72	56	54	54	58	48	42
5	.....	73	76	71	78	55	56	55	51	57	44	44
6	.....	68	72	72	79	74	63	56	55	51	45	43
7	.....	76	72	78	76	72	59	57	55	55	44	41
8	.....	73	72	79	66	72	59	59	60	58	42	41
9	39	76	72	78	78	71	59	59	56	57	43	41
10	45	76	68	79	76	72	56	62	60	58	41	42
11	57	74	68	79	76	68	55	58	58	62	42	43
12	52	63	68	74	76	63	62	55	60	58	41	41
13	58	68	.....	78	76	71	56	56	58	58	42	42
14	54	73	.....	78	76	71	64	59	58	56	48	41
15	58	68	73	79	73	73	66	55	60	58	52	41
16	49	68	77	78	76	73	.....	56	62	54	48	41
17	56	68	79	78	76	71	.....	58	60	54	45	41
18	62	68	78	77	77	66	.....	57	52	57	45	44
19	55	73	77	77	78	64	.....	68	52	51	44	44
20	55	64	78	77	77	65	.....	66	59	46	44	45
21	57	73	78	77	76	66	.....	68	59	59	43	43
22	57	72	79	77	76	60	.....	66	55	64	45	42
23	64	66	79	73	76	64	43	64	62	54	44	44
24	66	66	74	73	76	60	54	62	64	54	44	43
25	65	66	65	73	74	60	55	60	58	58	42	41
26	62	64	71	78	78	57	54	59	59	63	51	43
27	62	62	70	73	73	59	54	63	60	65	48	43
28	78	64	72	78	74	59	66	62	60	59	48	42
29	78	.....	68	79	74	59	68	63	60	59	43	42
30	79	.....	71	78	73	60	63	60	70	58	42	43
31	79	.....	70	.....	73	.....	63	62	.....	56	.....	41

NOTE.—Daily discharge determined by means of a weir. No flow in the canal on days for which no discharge is given.

Monthly discharge of Mentone Power Co.'s canal near Mentone, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	79	0	44.7	2,750
February	76	62	69.7	3,870
March	79	0	67.8	4,170
April	79	64	75.6	4,500
May	79	66	75.8	4,660
June	73	55	66.5	3,960
July	68	0	45.3	2,790
August	68	51	59.5	3,660
September	70	51	58.4	3,480
October	68	46	57.5	3,540
November	52	41	45.0	2,680
December	45	41	42.4	2,610
The year	79	0	58.9	42,700

NOTE.—Monthly discharge computed from records kept on weir at intake.

Daily discharge, in second-feet, of Santa Ana River and Mentone Power Co.'s canal near Mentone, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a8,500	112	90	122	89	75	59	57	73	72	54	45
2		110	92	140	89	74	60	59	73	63	48	44
3		110	98	107	89	74	59	60	74	61	47	46
4		121	100	98	89	74	58	53	58	62	50	44
5		99	102	97	89	57	58	57	55	61	46	46
6		116	98	90	90	76	65	58	59	55	47	45
7		114	98	89	87	74	61	59	59	59	46	43
8		111	98	90	77	74	61	61	64	62	44	43
9		139	98	89	89	73	61	61	60	61	45	43
10		179	94	90	87	74	58	64	68	62	43	44
11		177	94	132	87	70	57	60	66	66	44	45
12		166	94	137	87	65	64	57	75	73	43	43
13		131	109	141	87	73	58	58	73	73	44	44
14		136	109	141	87	77	66	61	66	71	50	43
15		94	99	142	84	79	68	57	64	60	54	43
16		94	103	141	87	79	85	58	77	56	50	43
17		94	105	131	79	77	85	60	64	56	47	43
18		94	104	130	88	72	74	59	56	59	47	46
19		99	103	103	89	70	74	70	56	53	46	46
20		90	104	95	88	71	63	68	63	48	46	47
21		99	104	88	87	68	63	70	63	61	45	45
22		98	105	88	87	62	63	68	59	66	47	44
23	167	92	105	79	87	66	69	66	66	56	46	46
24	129	92	100	79	87	62	72	64	68	56	46	45
25	219	92	108	84	85	62	66	62	62	60	44	43
26	185	90	114	84	80	59	60	61	63	65	53	45
27	165	88	96	79	75	61	60	65	64	67	50	45
28	181	90	98	84	76	61	68	64	64	61	50	44
29	181	.....	131	90	76	61	70	65	64	61	45	44
30	164	.....	119	89	75	62	65	62	74	60	44	45
31	164	.....	118	.....	75	.....	65	95	.....	58	.....	43

a Estimated.

Monthly discharge of Santa Ana River and Mentone Power Co.'s canal near Mentone, Cal., for 1910.

[Drainage area, 182 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January (23–31)	219	129	173	0.951	0.32	3,090
February	179	88	112	.615	.64	6,220
March	131	90	103	.566	.65	6,330
April	142	79	105	.577	.64	6,250
May	90	75	84.9	.466	.54	5,220
June	79	57	69.4	.381	.43	4,130
July	85	57	65.0	.357	.41	4,000
August	95	53	62.5	.343	.40	3,840
September	77	55	65.0	.357	.40	3,870
October	73	48	61.4	.337	.39	3,780
November	54	43	47.0	.258	.29	2,800
December	47	43	44.4	.244	.28	2,730
The period	.....	.....	.....	.....	.....	52,300

SAN GABRIEL RIVER BASIN.

SAN GABRIEL RIVER AND POWER CANAL NEAR AZUSA, CAL.

San Gabriel River is one of the three most important streams traversing the valley of southern California. Its drainage basin lies wholly in Los Angeles County west of the Santa Ana basin and east of the Los Angeles basin, and stretches from the crest of the Sierra Madre to the Pacific, a distance of about 50 miles. Its total drainage area is approximately 700 square miles, about one-third of which consists of mountain slopes, which contribute practically all of the run-off except in heavy storms. The remaining two-thirds is embraced in the San Gabriel Valley at the base of the mountains and in the coastal plain southeast of the city of Los Angeles.

The main stream is formed by the junction of two principal forks, one from the north and east and the other from the west. Each of the branches receives many tributaries from the crests of the surrounding ranges. The headwaters come from the western slope of San Antonio Peak (Old Baldy), altitude 10,080 feet, and from the southern slope of other high peaks at the north, such as North Baldy and Islip mountains. The west fork drains the northern slope of Mount Wilson, the eastern and northern slopes of San Gabriel Peak, and a portion of the southern slopes of the main range to the north. It joins the main stream about 8 miles above the mouth of the canyon. The general course of the stream is southwestward. After leaving the mountains it traverses San Gabriel Valley in a wide wash of sand, gravel, and bowlders, then breaks through the range of foothills separating San Gabriel Valley from the coastal plain at a point called The Narrows, about 5 miles northwest of Whittier, and enters the coastal plain, across which it flows to its mouth in Alamitos Bay, a few miles east of Long Beach. The total length of the stream is about 65 or 70 miles.

The principal tributaries of San Gabriel River are Fish Fork and Cattle Creek from the east and Iron and West forks from the west.

The basin is rather poorly forested, having a sparse timber growth on the higher slopes and brush with some scattering timber on the middle and lower elevations.

This station, which is located just above the road crossing at the mouth of the canyon, about one-fourth mile above the Pacific Light & Power Co.'s power house and 2 miles north of Azusa, in the NW. ¼ sec. 23, T. 1 N., R. 10 W., S. B. M., was established in 1896. Estimates of flow were very unsatisfactory until after the completion of the power canal in 1898.

The station is well below all tributaries and is several miles below the power and irrigation diversions.

The gage is an inclined staff in several sections, on the left bank.

Discharge measurements are made from a cable at the gage.

The flow in the canal is measured by a weir and is added to that at the station to obtain the total flow of the stream. Various temporary diversions for irrigation just above the station affect the discharge. The acquired water rights greatly exceed the low-water flow of the stream.

The channel is composed of gravel and bowlders and is subject to considerable change, especially above and below the measuring section. The current is swift, and measurements at flood stages are difficult.

The rating curve for 1910 is fairly well defined for low and medium stages. The record for high stages is approximate.

Discharge measurements of San Gabriel River and power canal near Azusa, Cal., in 1910.

Date.	Hydrographer.	Gage height.	Discharge.		
			River.	Canal.	Total.
		Feet.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*
Jan. 3	J. E. Stewart	5.10	1,870	57	1,930
29	R. E. Haines	3.60	267	69	336
Feb. 28	Clapp and Stewart	3.15	80	73	153
Mar. 30	W. B. Clapp	3.30	108	73	181
Apr. 12	J. E. Stewart	3.10	84	72	156
29	W. B. Clapp	2.80	40	72	112
May 5	.....do	2.63	23	72	95
13	.....do	2.24	6	72	78
June 3	.....do	1.85	0	68	68

NOTE.—Additional diversions were being made at a tunnel about 800 feet above the gage as follows:
April 29, 3 second-feet (estimated).
May 5, 14.5 second-feet.
May 13, 15.9 second-feet.
June 3, 0 second-feet.
These diversions are not included in any of the values in the above table.

Daily gage height, in feet, of San Gabriel River near Azusa, Cal., for 1910.

[H. E. Ward, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	[a]9.8	3.6	3.1	3.2	2.7	1.85	16	4.0	3.3	3.0	3.0	2.2	.....
2	5.9	3.5	3.1	3.2	2.7	.....	17	3.9	3.3	3.0	3.0	2.2	.....
3	5.1	3.5	3.1	3.2	3.7	.....	18	3.9	3.3	3.1	3.0	2.2	.....
4	4.8	3.5	3.1	3.2	2.7	.....	19	3.9	3.3	3.0	3.0	2.2	.....
5	4.5	3.5	3.1	3.1	2.7	.....	20	3.9	3.3	3.0	3.0	2.2	.....
6	4.5	3.4	3.1	3.1	2.6	.....	21	3.9	3.2	3.0	2.9	2.2	.....
7	4.5	3.4	3.1	3.1	2.6	.....	22	3.8	3.2	3.45	2.9	2.2	.....
8	4.2	3.4	3.1	3.1	2.6	.....	25	3.8	3.2	3.2	2.9	2.1	.....
9	4.2	3.4	3.1	3.1	2.5	.....	24	3.8	3.2	3.2	2.9	2.1	.....
10	4.1	3.4	3.1	3.1	2.5	.....	25	3.7	3.2	3.1	2.9	2.1	.....
11	4.1	3.4	3.1	3.1	2.5	.....	26	3.7	3.2	3.1	2.9	2.1	.....
12	4.1	3.3	3.0	3.1	2.3	.....	27	3.7	3.1	3.1	2.9	2.1	.....
13	4.0	3.3	3.0	3.1	2.3	.....	28	3.7	3.1	3.3	2.9	2.1	.....
14	4.0	3.3	3.0	3.0	2.3	.....	29	3.6	.....	3.3	2.8	2.0	.....
15	4.0	3.3	3.0	3.0	2.3	.....	30	3.6	.....	3.3	2.7	2.0	.....
							31	3.5	.....	3.3	.....	1.9	.....

[a] Maximum, 10.3 feet; corresponding discharge, 13,900 second-feet.

NOTE.—Water was standing in pools June 2 to June 18. From June 19 to Dec. 31 the river bed was dry.

Daily discharge, in second-feet, of San Gabriel River near Azusa, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	12,400	253	78	96	30	.....	16	541	119	63	63	4.5	.....
2	3,080	200	78	96	30	.....	17	455	119	63	63	4.5	.....
3	1,850	200	78	96	30	.....	18	455	119	78	63	4.5	.....
4	1,440	200	78	96	30	.....	19	455	119	63	63	4.5	.....
5	1,070	200	78	78	30	.....	20	455	119	63	63	4.5	.....
6	1,070	153	78	78	22	.....	21	455	96	63	50	4.5	.....
7	1,070	153	78	78	22	.....	22	379	96	176	50	4.5	.....
8	733	153	78	78	22	.....	23	379	96	96	50	2.5	.....
9	733	153	78	78	16	.....	24	379	96	96	50	2.5	.....
10	634	153	78	78	16	.....	25	312	96	78	50	2.5	.....
11	634	153	78	78	16	.....	26	312	96	78	50	2.5	.....
12	634	119	63	78	7	.....	27	312	78	78	50	2.5	.....
13	541	119	63	78	7	.....	28	312	78	119	50	2.5	.....
14	541	119	63	63	7	.....	29	253	.....	119	39	1	.....
15	541	119	63	63	7	.....	30	253	.....	119	30	1	.....
							31	200	.....	119	.....	0.5	.....

NOTE.—Daily discharge January to May determined from a rating curve fairly well defined below 2,000 second-feet.

Monthly discharge of San Gabriel River near Azusa, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	12,400	200	1,060	65,200	C.
February	253	78	135	7,500	B.
March	176	63	83.3	5,120	B.
April	96	30	66.5	3,960	B.
May	30	.5	11.0	676	B.
The period				82,500	

NOTE.—River dry June 1 to Dec. 31, 1910.

Daily discharge, in second-feet, of San Gabriel canal near Azusa, Cal., for 1910.

[H. E. Ward, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	53	69	73	73	72	67	49	33	24	23	26	33
2	49	72	73	73	72	68	50	32	24	22	26	32
3	57	74	73	74	72	68	49	31	24	23	29	31
4	68	74	73	73	72	68	48	31	24	23	31	32
5	71	74	73	73	72	68	47	31	25	24	29	32
6	70	74	73	73	72	67	45	30	25	23	28	32
7	71	74	73	73	73	67	45	29	24	22	29	32
8	71	73	73	72	72	66	43	29	24	23	29	32
9	72	73	73	73	72	63	42	29	24	23	29	31
10	72	73	73	73	72	63	42	29	23	23	28	32
11	72	74	73	72	72	61	40	29	23	25	27	32
12	72	73	73	72	72	60	41	29	23	26	27	33
13	73	74	73	72	72	61	40	29	23	26	39	32
14	72	65	73	72	72	62	40	29	24	26	36	32
15	72	66	73	72	72	66	39	29	24	32	36	32
16	73	71	73	72	72	66	39	28	24	32	35	32
17	72	73	73	72	72	64	37	28	24	31	34	32
18	72	73	73	72	72	58	38	26	23	30	34	33
19	65	73	73	72	71	56	38	25	22	27	34	34
20	22	73	73	72	71	54	36	26	23	26	32	36
21	70	74	73	72	70	54	37	26	23	26	32	35
22	73	73	73	72	70	55	37	26	21	26	32	33
23	75	73	73	72	70	56	36	26	21	25	32	33
24	70	73	73	71	70	54	35	26	21	24	31	35
25	68	73	73	72	70	52	36	25	22	24	31	35

Daily discharge, in second-feet, of San Gabriel canal near Azusa, Cal., for 1910—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	74	73	73	71	70	50	34	25	22	25	34	34
27	69	73	73	72	70	49	35	26	22	25	34	34
28	69	73	73	72	69	50	35	25	22	24	33	33
29	69	.....	73	72	69	50	35	25	22	24	33	33
30	69	.....	73	72	68	50	34	25	22	27	33	32
31	69	.....	73	.....	68	.....	35	25	.....	27	.....	33

NOTE.—Discharge determined by means of a weir.

Monthly discharge of San Gabriel canal near Azusa, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	75	22	67.5	4,150
February	74	65	72.5	4,030
March	73	73	73.0	4,490
April	74	71	72.3	4,300
May	73	68	71.1	4,370
June	68	49	59.8	3,560
July	50	34	39.9	2,450
August	33	25	27.8	1,710
September	25	21	23.1	1,370
October	32	22	25.4	1,560
November	39	26	31.4	1,870
December	36	31	32.8	2,020
The year	75	21	49.6	35,900

NOTE.—Monthly discharge computed from record kept on the weir.

Daily discharge, in second-feet, of San Gabriel River and San Gabriel power canal near Azusa, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12,500	322	151	169	102	67	49	33	24	23	26	33
2	3,140	272	151	169	102	68	50	32	24	22	26	32
3	1,900	274	151	170	102	68	49	31	24	23	29	31
4	1,510	274	151	169	102	68	48	31	24	23	31	32
5	1,140	274	151	151	102	68	47	31	25	24	29	32
6	1,140	227	151	151	94	67	45	30	25	25	28	32
7	1,140	227	151	151	95	67	45	29	24	22	29	32
8	804	226	151	150	94	66	43	29	24	23	29	32
9	805	226	151	151	88	63	42	29	24	23	29	31
10	706	226	151	151	88	63	42	29	23	23	28	32
11	706	227	151	150	88	61	40	29	23	25	27	32
12	706	192	136	150	79	60	41	29	23	26	27	33
13	614	193	136	150	79	61	40	29	23	26	39	32
14	613	184	136	135	79	62	40	29	24	26	36	32
15	613	185	136	135	79	66	39	29	24	32	36	32
16	614	190	136	135	76	66	39	28	24	32	35	32
17	527	192	136	135	76	64	37	28	24	31	34	32
18	527	192	151	135	76	58	38	26	23	30	34	33
19	520	192	136	135	76	56	38	25	22	27	34	34
20	477	192	136	135	76	54	36	26	23	26	32	36
21	525	170	136	122	75	54	37	26	23	26	32	35
22	452	169	249	122	74	55	37	26	21	26	32	33
23	454	169	169	122	73	56	36	26	21	25	32	33
24	449	169	169	121	73	54	35	26	21	24	31	35
25	380	169	151	122	72	52	36	25	22	24	31	35
26	386	169	151	121	72	50	34	25	22	25	34	34
27	381	151	151	122	72	49	35	26	22	25	34	34
28	381	151	192	122	71	50	35	25	22	24	33	33
29	322	.....	192	111	70	50	35	25	22	24	33	33
30	322	.....	192	102	69	50	34	25	22	27	33	32
31	269	.....	192	.....	68	.....	35	25	.....	27	.....	33

Monthly discharge of San Gabriel River and power canal near Azusa, Cal., for 1910.

[Drainage area, 222 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	12,500	269	1,130	5.09	5.87	69,500
February	322	151	207	.932	.97	11,500
March	249	136	156	.703	.81	9,590
April	170	102	139	.626	.70	8,270
May	102	68	82.1	.370	.43	5,050
June	68	49	59.8	.269	.30	3,560
July	50	34	39.9	.180	.21	2,450
August	33	25	27.8	.125	.14	1,710
September	25	21	23.1	.104	.12	1,370
October	32	22	25.4	.114	.13	1,560
November	39	26	31.4	.141	.16	1,870
December	36	31	32.8	.148	.17	2,020
The year	12,500	21	163	.734	10.01	118,000

NOTE.—This table does not include diversion made at tunnel about 800 feet above the gage. Hence the discharge per square mile and the run-off in inches are subject to considerable error during the irrigating season.

LOS ANGELES RIVER BASIN.

ARROYO SECO NEAR PASADENA, CAL.

Los Angeles River is formed by Tujunga, Pacoima, and other small creeks, whose sources lie in the Sierra Madre northeast of the city of Los Angeles. These streams leave the mountains at a point about 25 miles above the city and enter the comparatively flat country of the San Fernando Valley, where, except at times of excessive flood, the waters disappear in the sand and gravel washes. At the lower end of this valley is a secondary range of hills, extending from east to west, and bed-rock obstruction forces the waters to the surface to form what is known as Los Angeles River. Below this point the river flows through the flat country of the Los Angeles Valley and enters the Pacific near the town of Long Beach.

At the city of Los Angeles it is joined by Arroyo Seco, which drains an area comprising 21 square miles of the Sierra Madre. This stream issues from the mountains on the west side of Pasadena Mesa, and passes through an opening in a granite spur known as Devils Gate. Between the point where it leaves the mountain and Devils Gate lies a broad river bottom 2 miles long, composed of coarse material. In passing over this the water sinks rapidly, diminishing in volume of flood water from the mouth of the canyon to Devils Gate.

During the summer months the entire flow of Los Angeles River is diverted at a point about 5 miles above Los Angeles for the supply of the city, only a small amount of water passing this point except during flood periods.

The gaging station, which is located in the SE. ¼ sec. 30, T. 2 N., R. 12 W., S. B. M., at the ranger's camp in the Angeles National Forest, about 4 miles north of Pasadena, was established December 1, 1910.

The staff gage is in two sections, fastened to an alder tree on the right bank, 300 feet southeast of the ranger's cabin. Discharge measurements are made by wading near the gage.

This station is maintained in cooperation with the United States Forest Service.

No estimate has been prepared for 1910.

The following discharge measurement was made by W. V. Hardy, by wading about 50 feet below gage:

December 1, 1910: Width, 3.5 feet; area, 1.4 square feet; gage height, 3.44 feet; discharge, 1.4 second-feet.

Daily gage height, in feet, of Arroyo Seco near Pasadena, Cal., for 1910.

[O. F. Dunston, observer.]

Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.
1		9	3.48	16	3.55	24	3.60
2		10	3.47	17	3.57	25	3.62
3				18	3.56		
4		11	3.48	19	3.56	26	3.62
5	3.47	12	3.47	20	3.57	27	3.63
6		13	3.49			28	3.63
7	3.48	14	3.51	21	3.57	29	3.62
8	3.48	15	3.54	22	3.54	30	3.62
9	3.47			23	3.59	31	3.63

SANTA YNEZ RIVER BASIN.

GENERAL FEATURES.

Santa Ynez River is the only important stream lying wholly in Santa Barbara County. Its drainage basin lies north of the Santa Ynez Mountains, extending for a distance of about 80 miles parallel to the coast line, and comprising approximately 900 square miles. Four-fifths of this area is mountainous, including the north slope of the Santa Ynez and the south slope of the San Rafael Mountains, and furnishes practically all of the run-off.

Santa Ynez River rises near the boundary line between Ventura and Santa Barbara counties, where the Santa Ynez and San Rafael ranges merge, flows nearly due west, and enters the Pacific Ocean at Surf, about 8 miles north of Point Arguello lighthouse, where the coast line makes a sharp turn to the north.

Small tributaries are numerous, but the only one of importance is Mono Creek, which drains 120 square miles of the southern slope of the San Rafael Mountains, and joins the Santa Ynez River about 13 miles below its source.

SANTA YNEZ RIVER NEAR SANTA BARBARA, CAL.

This station was originally established on November 21, 1902, above the mouth of Mono Creek. On November 1, 1903, the station was moved downstream about 5 miles to a point about one-fourth mile below the Gibraltar dam site, in the NE. ¼ NE. ¼ sec. 15, T. 5 N., R. 27 W., S. B. M., and about 12 miles north of Santa Barbara.

Mono Creek enters about 3½ miles above the station. No water is diverted above the gage. Water rights far exceed the mean low-water flow of the stream. The drainage area above the station is about 207 square miles.

The staff gage, in three sections, is on the right bank, about 300 yards below the north portal of the Santa Barbara city waterworks tunnel now under construction. The gage datum at the new station has not been changed. No records were obtained during 1909.

The channel is composed of sand and gravel and is fairly permanent. As no discharge measurements have been made recently, no estimates of daily discharge have been prepared for 1910.

The station is maintained by the city of Santa Barbara. The gage-height record has been furnished by the board of water commissioners through their engineer, Lee M. Hyde.

Daily gage height, in feet, of Santa Ynez River near Santa Barbara, Cal., for 1910.

[Andrew Pangell, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.0			1.45	1.25	1.05	1.0		1.1	1.0
2		2.0			1.45	1.25	1.05	1.0		1.1	1.0
3		2.0			1.40	1.2	1.05	1.0		1.1	1.0
4		2.0	1.95		1.4	1.2	1.07	1.0		1.10	1.0
5		2.0	2.25		1.4	1.2	1.05	1.0		1.10	1.0
6	2.0	1.95	2.0		1.4	1.2	1.05	1.0		1.15	1.0
7	2.0	1.95	2.0		1.4	1.2	1.05	1.0		1.20	1.0
8	2.0	1.95	2.0		1.4	1.2	1.05	1.0			1.0
9	2.0	1.95	2.0		1.4	1.2	1.05	1.0		1.20	1.0
10	2.0	1.95	2.0		1.4	1.15	1.05	1.0		1.2	1.0
11	2.0	1.95	2.0	1.7	1.4	1.15	1.05	1.0		1.2	1.0
12	2.0	1.95	2.00	1.7	1.4	1.1	1.05	1.0		1.2	1.0
13	2.0	1.95	2.05	1.7	1.4	1.1	1.05	1.0		1.2	1.0
14	2.0	2.0	2.05	1.7	1.4	1.1	1.05	1.0		1.2	1.0
15	2.0	2.0	2.05	1.7	1.4	1.1	1.05	1.0		1.2	1.0
16	2.0	1.95	2.05	1.7	1.4	1.1	1.05	1.0		1.2	1.0
17	2.0	1.95	2.0	1.65	1.4	1.1	1.05	1.0		1.2	1.0
18	2.0	1.95	2.0	1.65	1.4	1.1	1.07	1.0		1.2	1.0
19	2.0	1.95	2.0	1.65	1.4	1.1	1.05	1.0		1.2	1.0
20	2.0	1.95	2.0	1.65	1.35	1.1	1.05	1.0		1.2	1.0
21	2.0	1.95	2.0	1.65	1.35	1.1	1.05	1.0		1.2	1.0
22	2.0		2.0	1.6	1.35	1.1	1.05	1.0		1.2	1.0
23	2.0		2.0	1.6	1.35	1.1	1.07	1.0		1.2	
24	2.0	2.0	2.0	1.6	1.3	1.1	1.05	1.0		1.2	1.0
25	2.0	2.0		1.6	1.3	1.1	1.05	1.0		1.2	1.0
26	2.0	1.8		1.6	1.3	1.1	1.0			1.2	1.0
27	2.0	1.6		1.50	1.30	1.1	1.0			1.2	1.0
28	2.0	1.6		1.50	1.30	1.1	1.0			1.2	1.0
29				1.50	1.30	1.0	1.0			1.2	1.0
30				1.5	1.25	1.05	1.0			1.2	1.0
31				1.5		1.05	1.0				1.0

SANTA YNEZ RIVER NEAR LOMPOC, CAL.

This station, which was established November 10, 1906, was originally located at the wagon bridge 1½ miles east of Lompoc, in La Misión Vieja de la Purísima land grant. Early in January, 1907, the bridge was destroyed by heavy floods. A new bridge was built during the summer of 1907, and the station was reestablished September 25, 1907, at the same location.

No tributaries enter the stream in the vicinity of the station and no diversions have been made above since the station was established. The headworks of canals previously diverting water were destroyed by floods and have not been reconstructed. Acquired water rights exceed the low flow of the stream. The drainage area above the station is about 785 square miles. There are several pumping plants above the station that obtain water for irrigation from wells along the banks of the stream.

The gage is a vertical staff on the pier of the bridge from which discharge measurements are made. The datum of the gage has remained unchanged since the station was established.

The conditions at this station are extremely unfavorable for accurate results. The channel is wide and the stream shifts constantly.

The estimates for 1910 can be considered fair for low stages and only approximate for high, as no high water measurements were obtained.

Discharge measurements of Santa Ynez River near Lompoc, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 30[a]	W. B. Clapp	149	157	4.10	309
Mar. 5	J. E. Stewart	163	83	3.84	112
Apr. 15	Donald McDonald	184	125	4.00	135
May 4[b]	do	170	81	3.90	98
27[b]	do	60	42	3.80	58
June 9[b]	J. E. Stewart	62	32	3.79	40
9[b]	do	52	32	3.79	42
Aug. 4[b]	Donald McDonald	57	25	3.55	20
Sept. 14[b]	C. C. Jacob	57	23	3.60	22

[a] Made from upstream side of bridge. [b] Made by wading about 1 mile above gage.

Daily gage height, in feet, of Santa Ynez River near Lompoc, Cal., for 1910.

[D. McDonald, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.65	4.0	3.9	4.4	3.9	3.8	3.7	3.55	3.6	3.6	3.6	3.7
2	5.0	4.0	3.8	4.3	3.9	3.8	3.7	3.55	3.6	3.6	3.6	3.7
3	4.8	4.0	3.8	4.3	3.9	3.8	3.7	3.55	3.6	3.6	3.6	3.7
4	4.5	4.0	3.8	4.2	3.9	3.8	3.7	3.55	3.6	3.6	3.65	3.7
5	4.4	3.9	3.8	4.2	3.9	3.8	3.7	3.55	3.6	3.6	3.7	3.7
6	4.4	3.9	3.85	4.2	3.9	3.8	3.7	3.55	3.6	3.6	3.7	3.7
7	4.4	3.9	3.85	4.2	3.9	3.8	3.65	3.55	3.6	3.6	3.7	3.7
8	4.3	3.9	3.8	4.2	3.9	3.8	3.65	3.55	3.6	3.6	3.7	3.7
9	4.3	3.9	3.8	4.1	3.9	3.8	3.65	3.55	3.6	3.6	3.7	3.7
10	4.2	3.9	3.8	4.1	3.9	3.8	3.65	3.55	3.6	3.6	3.7	3.7

Daily gage height, in feet, of Santa Ynez River near Lompoc, Cal., for 1910—Contd.

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	4.1	3.9	3.8	4.1	3.9	3.8	3.65	3.55	3.6	3.6	3.7	3.7
12	4.1	3.9	3.8	4.1	3.9	3.8	3.65	3.55	3.6	3.6	3.7	3.7
13	4.0	3.9	3.8	4.1	3.9	3.8	3.65	3.55	3.6	3.65	3.7	3.7
14	4.0	3.9	3.9	4.1	3.9	3.8	3.65	3.55	3.6	3.65	3.7	3.7
15	4.3	3.9	3.85	4.0	3.9	3.8	3.6	3.55	3.7	3.65	3.7	3.7
16	4.4	3.9	3.8	4.0	3.9	3.8	3.6	3.6	3.7	3.65	3.7	3.7
17	4.7	3.9	3.8	4.0	3.8	3.75	3.6	3.6	3.7	3.6	3.7	3.7
18	4.5	3.9	3.9	4.0	3.8	3.75	3.6	3.6	3.65	3.6	3.7	3.7
19	4.4	3.9	3.9	4.0	3.8	3.75	3.6	3.6	3.65	3.6	3.7	3.7
20	4.3	3.9	3.9	4.0	3.8	3.75	3.6	3.6	3.6	3.6	3.7	3.8
21	4.3	3.9	3.9	3.9	3.8	3.75	3.55	3.6	3.6	3.6	3.7	3.75
22	4.2	3.9	4.5	3.9	3.8	3.75	3.55	3.6	3.6	3.6	3.7	3.75
23	4.2	3.9	4.3	3.9	3.8	3.7	3.55	3.6	3.6	3.6	3.7	3.75
24	4.2	3.9	4.2	3.9	3.8	3.7	3.55	3.6	3.6	3.6	3.7	3.7
25	4.2	3.9	4.1	3.9	3.8	3.7	3.55	3.6	3.6	3.6	3.7	3.7
26	4.2	3.9	4.1	3.9	3.8	3.7	3.6	3.6	3.6	3.6	3.7	3.7
27	4.2	3.9	4.45	3.9	3.8	3.7	3.6	3.6	3.6	3.6	3.7	3.7
28	4.1	3.9	4.9	3.9	3.8	3.7	3.55	3.6	3.6	3.65	3.7	3.7
29	4.1	.....	4.6	3.9	3.8	3.7	3.55	3.6	3.6	3.65	3.7	3.7
30	4.1	.....	4.5	3.9	3.8	3.7	3.55	3.6	3.6	3.65	3.7	3.7
31	4.0	.....	4.5	.....	3.8	.....	3.55	3.6	.....	3.65	.....	3.7

Daily discharge, in second-feet, of Santa Ynez River near Lompoc, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11,100	225	150	550	95	52	30	20	22	22	22	30
2	1,580	225	90	385	95	51	30	20	22	22	22	30
3	1,200	225	90	380	95	49	30	20	22	22	22	30
4	750	225	90	275	95	48	30	20	22	22	26	30
5	620	150	90	275	95	47	30	20	22	22	30	30
6	620	150	120	275	95	46	30	20	22	22	30	30
7	620	150	120	275	95	44	26	20	22	22	30	30
8	500	150	90	275	95	43	26	20	22	22	30	30
9	500	150	90	197	95	42	26	20	22	22	30	30
10	400	150	90	197	95	42	26	20	22	22	30	30
11	310	150	90	197	95	42	26	20	22	22	30	30
12	310	150	90	197	95	42	26	20	22	22	30	30
13	225	150	90	197	95	42	26	20	22	26	30	30
14	225	150	150	197	95	42	26	20	22	26	30	30
15	500	150	120	138	95	42	22	20	30	26	30	30
16	620	150	90	138	95	42	22	22	30	26	30	30
17	1,040	150	90	138	58	36	22	22	30	22	30	30
18	750	150	150	138	58	36	22	22	26	22	30	30
19	620	150	150	138	58	36	22	22	26	22	30	30
20	500	150	150	138	58	36	22	22	22	22	30	42
21	500	150	150	95	58	36	20	22	22	22	30	36
22	400	150	740	95	58	36	20	22	22	22	30	36
23	400	150	480	95	58	30	20	22	22	22	30	36
24	400	150	375	95	58	30	20	22	22	22	30	30
25	400	150	275	95	58	30	20	22	22	22	30	30
26	400	150	270	95	58	30	22	22	22	22	30	30
27	400	150	615	95	58	30	22	22	22	22	30	30
28	310	150	1,260	95	57	30	20	22	22	26	30	30
29	310	.....	785	95	56	30	20	22	22	26	30	30
30	310	.....	640	95	54	30	20	22	22	26	30	30
31	225	.....	625	.....	53	.....	20	22	.....	26	.....	30

NOTE.—Daily discharge determined from rating curves applicable as follows: Jan. 1 to Mar. 21, poorly defined and only approximate above 400 second-feet; Mar. 22 to Apr. 3, indirect method for shifting channels; Apr. 4 to May 27, poorly defined; June 9 to Dec. 31, poorly defined. Discharge interpolated May 28 to June 8.

Monthly discharge of Santa Ynez River near Lompoc, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	11,100	225	872	53,600	D.
February	225	150	161	8,940	C.
March	1,260	90	271	16,700	C.
April	550	95	188	11,200	C.
May	95	53	76.7	4,720	C.
June	52	30	39.1	2,330	C.
July	30	20	24.0	1,480	C.
August	22	20	21.0	1,290	C.
September	30	22	23.1	1,370	C.
October	26	22	23.0	1,410	C.
November	30	22	29.1	1,730	C.
December	42	30	31.0	1,910	C.
The year	11,100	20	147	107,000	

SALINAS RIVER BASIN.[1]

ARROYO SECO NEAR SOLEDAD, CAL.

The Salinas River basin lies almost wholly in Monterey and San Luis Obispo counties, and comprises an area about 4,780 square miles in extent, having a length of 150 miles northwest-southeast and a maximum width of about 45 miles.

The Salinas rises on the eastern slope of the Santa Lucia Range, near the southern end of the basin and flows northwestward, parallel to the coast, to its mouth, about 4 miles southwest of Castroville.

The river has many tributaries, all as torrential and erratic as the Salinas itself, which has a very heavy discharge in winter and no surface run-off in summer ordinarily except below Soledad. The most important tributaries from north to south are Arroyo Seco, San Antonio River, and Nacimiento River from the west and San Lorenzo and Estrella creeks from the east. The tributaries from the west are peculiar in that they lie west of secondary ranges parallel to the main range and flow southeastward for the greater part of their length, parallel but in a course directly opposite to the general course of Salinas River.

The gaging station on Arroyo Seco was established January 1, 1901, at Pettitt's ranch, about 15 miles south of Soledad, in sec. 21, T. 19 S., R. 6 E.

No water is diverted above the station. The Clark Colony Water Co., irrigating about 4,000 acres, and the Spreckles Sugar Co. about 3,500 acres, divert water 1½ and 3 miles, respectively, below the station. These canals head above the broad wash of gravel and sand into which the low-water sinks and disappears, and from which the stream receives the name Arroyo Seco.

The staff gage is in two sections on the right bank.

[1] For a detailed discussion of the water resources of Salinas Valley see Water-Supply Paper 89.

Discharge measurements are made from a cable 300 feet below the gage. The channel shifts more or less during high water, and the current is very swift. Measurements made at such stages may be considerably in error.

The 1910 rating curve is fairly well defined and the record may be considered fair.

Discharge measurements of Arroyo Seco near Soledad, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 25	Charles Pettitt	122	255	6.88	546
30	....do	121	196	6.20	247
Feb. 11	....do	119	154	5.90	137
17	....do	107	147	5.80	105
27	....do	107	139	5.75	88
Mar. 6	J. E. Stewart	106	142	5.70	79
15	Charles Pettitt	107	141	5.72	86
20	....do	128	380	7.88	1,260
27	....do	126	306	7.20	798
Apr. 3	....do	123	208	6.33	331
11	....do	122	181	6.10	219
18	....do	121	156	5.88	134
26	....do	50	44	5.75	115
May 4	....do	61	46	5.70	95
8	....do	61	43	5.65	86
15	....do	60	37	5.55	58
23	....do	58	33	5.52	52
30	....do	54	24	5.45	34
June 5	....do	54	24	5.42	33
13	....do	53	23	5.38	30
19	....do	29	15	5.35	18
26	....do	28	14	5.30	14
July 3	....do	27	13	5.25	13
10	....do	25	11	5.20	9
17	....do	24	8.9	5.15	6.8
25	....do	22	6.4	5.08	3.6
30	....do	20	5.5	5.05	2.7
Aug. 21[a]	....do	8	3.7	4.98	1.2
Sept. 11[a]	....do	8	3.2	4.80	1.0
21[a]	....do	10	4.8	5.12	2.9
Oct. 31[a]	....do	11	6.7	5.20	7.8
Dec. 1[a]	....do	27	14	5.35	14

[a] Measurement not made at cable section.

Daily gage height, in feet, of Arroyo Seco near Soledad, Cal., for 1910.

[Mrs. Chas. Pettitt, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.15	6.15	5.75	6.5	5.7	5.4	5.25	5.05	4.93	5.1	5.2	5.35
2	6.5	6.15	5.75	6.4	5.7	5.4	5.25	5.05	4.93	5.1	5.25	5.35
3	6.4	6.1	5.7	6.35	5.7	5.4	5.24	5.04	4.92	5.1	5.25	5.35
4	6.2	6.0	5.7	6.28	5.7	5.4	5.24	5.03	4.91	5.1	5.25	5.4
5	6.0	6.0	5.7	6.20	5.7	5.4	5.22	5.03	4.90	5.1	5.25	5.4
6	5.95	5.95	5.7	6.20	5.7	5.4	5.22	5.03	4.89	5.1	5.25	5.4
7	5.9	6.0	5.7	6.15	5.7	5.4	5.21	5.02	4.86	5.1	5.25	5.35
8	5.9	6.0	5.7	6.1	5.7	5.4	5.21	5.01	4.84	5.1	5.25	5.35
9	5.85	5.95	5.7	6.1	5.65	5.4	5.20	5.00	4.82	5.1	5.25	5.35
10	5.85	5.9	5.7	6.05	5.65	5.4	5.20	5.00	4.81	5.1	5.25	5.4
11	5.8	5.9	5.65	6.1	5.6	5.4	5.20	5.00	4.80	5.12	5.3	5.4
12	5.8	5.9	5.65	6.05	5.6	5.4	5.19	5.00	4.78	5.18	5.3	5.45
13	5.75	5.85	5.65	6.0	5.6	5.4	5.16	4.98	4.72	5.3	5.3	5.45
14	6.6	5.85	5.7	6.0	5.6	5.4	5.16	4.98	4.70	5.3	5.3	5.4
15	7.05	5.85	5.7	5.95	5.55	5.4	5.15	4.98	4.78	5.25	5.3	5.4

Daily gage height, in feet, of Arroyo Seco near Soledad, Cal., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	7.05	5.8	5.7	5.9	5.55	5.35	5.15	4.98	4.80	5.25	5.3	5.4
17	6.8	5.8	5.7	5.9	5.55	5.35	5.15	4.98	5.15	5.25	5.3	5.4
18	6.5	5.8	5.7	5.9	5.55	5.35	5.15	4.98	5.15	5.2	5.3	5.4
19	6.4	5.8	5.7	5.85	5.55	5.35	5.13	4.98	5.14	5.2	5.3	5.4
20	6.35	5.8	6.8	5.85	5.55	5.35	5.13	4.98	5.14	5.2	5.3	5.4
21	6.25	5.75	8.7	5.85	5.55	5.35	5.12	4.98	5.13	5.2	5.3	5.4
22	6.2	5.75	8.6	5.8	5.5	5.35	5.10	4.98	5.13	5.2	5.3	5.4
23	6.1	5.85	7.6	5.8	5.5	5.35	5.10	4.98	5.12	5.2	5.3	5.4
24	7.35	5.8	7.05	5.8	5.5	5.3	5.09	4.97	5.12	5.2	5.3	5.4
25	6.9	5.8	6.75	5.75	5.5	5.3	5.09	4.96	5.12	5.2	5.35	5.4
26	6.7	5.8	6.6	5.75	5.5	5.3	5.09	4.95	5.12	5.2	5.35	5.4
27	6.5	5.75	7.5	5.75	5.45	5.3	5.08	4.95	5.12	5.2	5.35	5.4
28	6.35	5.75	7.0	5.75	5.45	5.25	5.08	4.94	5.12	5.2	5.35	5.4
29	6.3	.....	6.8	5.7	5.45	5.25	5.06	4.93	5.12	5.2	5.35	5.4
30	6.2	.....	6.7	5.7	5.45	5.25	5.05	4.93	5.12	5.2	5.35	5.4
31	6.2	.....	6.6	.....	5.45	.....	5.05	4.93	.....	5.2	.....	5.4

Daily discharge, in second-feet, of Arroyo Seco near Soledad, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,360	238	100	385	86	27	12	2.6	1.2	3.5	8	21
2	385	238	100	342	86	27	12	2.6	1.2	3.5	12	21
3	342	217	86	321	86	27	11	2.5	1.2	3.5	12	21
4	258	179	86	292	86	27	11	2.3	1.1	3.5	12	27
5	179	179	86	258	86	27	9.4	2.3	1.0	3.5	12	27
6	162	162	86	258	86	27	9.4	2.3	1.0	3.5	12	27
7	144	179	86	238	86	27	8.7	2.1	.9	3.5	12	21
8	144	179	86	217	86	27	8.7	2.0	.8	3.5	12	21
9	128	162	86	217	74	27	8	1.8	.8	3.5	12	21
10	128	144	86	198	74	27	8	1.8	.7	3.5	12	27
11	113	144	74	217	62	27	8	1.8	.7	4.4	15	27
12	113	144	74	198	62	27	7.6	1.8	.7	7.1	15	34
13	100	128	74	179	62	27	6.2	1.6	.5	15	15	34
14	430	128	86	179	62	27	6.2	1.6	.5	15	15	27
15	662	128	86	162	52	27	5.8	1.6	.7	12	15	27
16	662	113	86	144	52	21	5.8	1.6	.7	12	15	27
17	530	113	86	144	52	21	5.8	1.6	5.8	12	15	27
18	385	113	86	144	52	21	5.8	1.6	5.8	8	15	27
19	342	113	86	128	52	21	4.8	1.6	5.3	8	15	27
20	321	113	530	128	52	21	4.8	1.6	5.3	8	15	27
21	279	100	1,780	128	52	21	4.4	1.6	4.8	8	15	27
22	258	100	1,700	113	42	21	3.5	1.6	4.8	8	15	27
23	217	128	985	113	42	21	3.5	1.6	4.4	8	15	27
24	830	113	662	113	42	15	3.3	1.6	4.4	8	15	27
25	580	113	505	100	42	15	3.3	1.5	4.4	8	21	27
26	480	113	430	100	42	15	3.3	1.4	4.4	8	21	27
27	385	100	920	100	34	15	3.2	1.4	4.4	8	21	27
28	321	100	635	100	34	12	3.2	1.3	4.4	8	21	27
29	300	.....	530	86	34	12	2.8	1.2	4.4	8	21	27
30	258	.....	480	86	34	12	2.6	1.2	4.4	8	21	27
31	258	.....	430	.....	34	.....	2.6	1.2	.....	8	.....	27

NOTE.—Daily discharge determined from a fairly well defined discharge rating curve.

Monthly discharge of Arroyo Seco near Soledad, Cal., for 1910.

[Drainage area, 215 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	1,360	100	357	1.66	1.91	22,000	B.
February	238	100	142	.660	.69	7,890	B.
March	1,780	74	362	1.68	1.94	22,300	B.
April	385	86	180	.837	.93	10,700	B.
May	86	34	59.0	.274	.32	3,630	B.
June	27	12	22.3	.104	.12	1,330	B.
July	12	2.6	6.28	.029	.03	386	B.
August	2.6	1.2	1.75	.0081	.009	108	B.
September	5.8	.5	2.69	.013	.01	160	B.
October	15	3.5	7.24	.034	.04	445	B.
November	21	8.0	15.1	.070	.08	898	B.
December	34	21	26.3	.122	.14	1,620	B.
The year	1,780	.5	98.5	.458	6.22	71,500	

SAN FRANCISCO BAY DRAINAGE BASINS.

The great central valley of California, including an area about 64,000 square miles in extent lying between the Coast Range on the west and the Sierra Nevada on the east, is drained by two trunk streams. From the north comes the Sacramento; from the south the San Joaquin; both discharge their waters into Suisun Bay, whence they find outlet through Carquinez Strait and San Pablo Bay into San Francisco Bay, passing finally through the Golden Gate into the Pacific Ocean.

SAN JOAQUIN RIVER SYSTEM.

GENERAL FEATURES.

The San Joaquin drainage basin is the southern lobe of the great central basin of California and lies southeast of an imaginary line drawn from San Francisco Bay to Lake Tahoe. The rim of the basin is determined by the crest of the Sierra Nevada at the east, the Tehachapi Range at the south, and the Coast Range at the west. The basin is somewhat larger than the Sacramento Basin, with which it merges at the north. It has a length of about 280 miles northwest-southeast and a width of about 125 miles. It is roughly rectangular in shape, and comprises a total area of about 32,700 square miles.

San Joaquin River rises in the high Sierra south of the Yosemite National Park, about halfway between the north and south ends of the basin, and flows southwestward to the trough of the San Joaquin Valley, whence it takes a northwestward course to its mouth. It has a total length of approximately 350 miles—125 miles in the mountains and 225 in the valley. It discharges into Suisun Bay, about 50 miles

by water from San Francisco. It is navigable as far as Stockton, about 50 miles above its mouth.

All the important tributaries of San Joaquin drain parts of the western slope of the Sierra, take a course parallel to the upper San Joaquin—that is, southwestward—and enter from the east. In order from south to north they are Fresno, Chowchilla, Merced, Tuolumne, Stanislaus, Calaveras, and Mokelumne rivers. The principal streams from the Sierra south of the upper San Joaquin, in order from north to south, are Kings, Kaweah, Tule, and Kern rivers. These last-named streams, however, are not directly tributary to the San Joaquin, for they are lost in the Tulare Lake depression, which, under normal conditions, has no suface outlet to the San Joaquin. Kings River discharges partly into Tulare Lake and partly into the San Joaquin. Besides the North, Middle, and South forks, the upper San Joaquin has many smaller tributaries.

SAN JOAQUIN RIVER NEAR FRIANT, CAL.[1]

This station, which is located in the SE. ¼ sec. 34, T. 10 S., R. 21 E., at the Fort Miller ranch house, about 4 miles above the town of Friant, was established Oct. 18, 1907.

No important tributaries enter near the station and no water is diverted above except for water-power development, all such diverted water being returned to the river channel above the station. The entire flow of the stream is controlled by existing water rights, involving all irrigable lands tributary to San Joaquin River.

The staff gage is in two sections on the left bank; no change has been made in the gage datum since the station was established. Discharge measurements are made from a cable near the gage.

Conditions for obtaining accurate discharge data are fair. At low stages the current is very sluggish, but at such times check measurements can be made from the bridge at Friant. The channel is subject to slight changes which may somewhat affect the accuracy.

The 1909 curve was slightly revised for 1910 and is well defined. The record may be considered excellent.

Discharge measurements of San Joaquin River near Friant, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 7	J. E. Stewart	227	1,350	4.78	1,480
Apr. 4	do	236	1,310	6.36	3,640
May 14	do	249	2,170	8.74	7,540
30	do	255	2,270	9.52	9,750
July 14	W. V. Hardy	222	1,200	4.85	1,520
19	do	228	1,310	5.32	2,150
Aug. 24	J. E. Stewart	222	958	3.78	529
Sept. 28	do	222	900	3.45	342

[1] Town formerly known as Pollasky.

Daily gage height, in feet, of San Joaquin River near Friant, Cal., for 1910.

[E. G. Davis, Observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.3	5.1	4.9	5.8	7.85	9.9	5.3	4.35	3.65	.....	3.65	3.45
2	9.4	5.1	5.25	5.9	7.8	9.9	5.3	4.3	3.6	.....	3.55	3.45
3	7.1	4.95	5.45	6.05	8.2	8.85	5.2	4.2	3.6	.....	3.55	3.5
4	6.5	4.95	5.95	6.2	7.55	8.3	5.1	4.2	3.65	.....	3.5	3.6
5	6.3	4.9	5.95	6.8	7.05	8.1	4.9	4.15	3.6	3.5	3.5	3.6
6	6.0	4.85	6.0	6.5	7.2	7.0	4.7	4.1	3.6	3.5	3.5	3.6
7	5.7	4.8	6.2	6.75	7.55	6.8	4.75	4.05	3.55	3.5	3.5	3.6
8	5.5	4.9	6.2	7.1	8.7	6.6	4.9	4.05	3.5	3.5	3.5	3.7
9	5.35	4.9	6.25	7.55	9.0	6.5	5.0	4.0	3.5	3.5	3.5	3.75
10	5.25	4.8	6.4	7.75	9.0	6.65	5.05	3.95	3.45	3.5	3.45	3.7
11	5.15	4.7	6.25	7.45	9 05	6.8	4.95	3.95	3.45	3.5	3.45	3.75
12	4.95	4.8	6.4	7.0	9.25	7.0	5.05	3.95	3.4	4.1	3.4	4.75
13	4.95	4.85	6.5	6.8	9.2	7.0	5.0	3.9	3.4	3.7	3.5	4.5
14	5.0	4.9	6.45	7.4	8.95	6.8	4.9	3.85	3.5	3.8	3.9	3.9
15	5.2	4.9	6.25	7.7	9.45	6.45	4.85	3.8	1.45	3.8	3.8	3.9
16	8.5	4.9	5.85	8.0	9.35	5.9	4.8	3.8	4.5	3.85	3.6	3.8
17	6.2	4.85	5.7	8.6	8.85	5.95	4.7	3.8	5.0	3.95	3.6	3.8
18	5.7	4.9	6.0	8.8	8.35	5.85	5.2	3.8	8.0	3.9	3.6	3.7
19	5.5	4.9	6.6	9.15	8.7	5.8	5.3	3.8	7.85	4.0	3.6	3.7
20	5.35	4.8	7.05	9.4	8.9	5.75	5.5	3.75	3.95	3.95	3.6	3.7
21	5.25	4.7	6.75	8.9	8.8	5.7	5.15	3.75	3.65	3.85	3.6	3.7
22	5.25	4.7	6.7	9.15	9.2	5.6	5.05	3.75	3.6	3.8	3.5	3.65
23	5.55	4.7	6.45	9.3	9.2	5.5	4.85	3.9	3.6	3.8	3.6	3.65
24	5.8	4.7	6.2	9.7	9.6	5.5	4.7	3.85	3.6	3.8	3.6	3.7
25	5.85	4.7	6.0	9.75	9.2	5.6	4.6	3.85	3.55	3.75	3.7	3.7
26	5.55	4.8	5.7	10.3	8.5	5.5	4.55	3.8	3.55	3.7	3.6	3.65
27	5.35	4.85	5.7	9.6	8.8	5.6	4.5	3.8	3.5	3.65	3.6	3.6
28	5.25	4.85	5.65	8.85	9.6	5.5	4.5	3.8	3.5	3.6	3.45	3.4
29	5.25	.....	5.5	8.4	9.6	5.5	4.55	3.75	3.45	3.6	3.45	3.5
30	5.25	.....	5.5	8.15	9.5	5.5	4.4	3.7	3.45	3.55	3.45	3.5
31	5.2	.....	5.55	.....	9.6	.....	4.4	3.7	.....	3.55	.....	3.6

Daily discharge, in second-feet, of San Joaquin River near Friant, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11,300	1,850	1,610	2,700	5,870	10,300	2,090	1,030	450	368	450	346
2	9,070	1,850	2,030	2,830	5,780	10,300	2,090	982	420	368	394	346
3	4,580	1,670	2,270	3,030	6,530	7,840	1,970	886	420	368	394	368
4	3,660	1,670	2,900	3,240	5,330	6,720	1,850	886	450	368	368	420
5	3,380	1,610	2,900	4,100	4,500	6,340	1,610	839	420	368	368	420
6	2,960	1,560	2,960	3,660	4,740	4,420	1,390	792	420	368	368	420
7	2,570	1,500	3,240	4,020	5,330	4,100	1,440	747	394	368	368	420
8	2,330	1,610	3,240	4,580	7,530	3,800	1,610	747	368	368	368	480
9	2,150	1,610	3,310	5,330	8,160	3,660	1,730	702	368	368	368	513
10	2,030	1,500	3,520	5,680	8,160	3,880	1,790	661	346	368	346	480
11	1,910	1,390	3,310	5,160	8,270	4,100	1,670	661	346	368	346	513
12	1,670	1,500	3,520	4,420	8,720	4,420	1,790	661	324	792	324	1,440
13	1,670	1,560	3,660	4,100	8,600	4,420	1,730	620	324	480	368	1,180
14	1,730	1,610	3,590	5,070	8,060	4,100	1,610	583	368	546	620	620
15	1,970	1,610	3,310	5,600	9,190	3,590	1,560	546	1,130	546	546	620
16	7,120	1,610	2,760	6,150	8,950	2,830	1,500	546	1,180	583	420	546
17	3,240	1,560	2,570	7,320	7,840	2,900	1,390	546	1,730	661	420	546
18	2,570	1,610	2,960	7,740	6,820	2,760	1,970	546	6,150	620	420	480
19	2,330	1,610	3,800	8,490	7,540	2,700	2,090	546	5,870	702	420	480
20	2,150	1,500	4,500	9,070	7,950	2,640	2,330	513	661	661	420	480
21	2,030	1,390	4,020	7,950	7,740	2,570	1,910	513	450	583	420	480
22	2,030	1,390	3,950	8,490	8,600	2,450	1,790	513	420	546	368	450
23	2,390	1,390	3,590	8,830	8,600	2,330	1,560	620	420	546	420	450
24	2,700	1,390	3,240	9,790	9,550	2,330	1,390	583	420	546	420	480
25	2,760	1,390	2,960	9,900	8,600	2,450	1,280	583	394	513	480	480
26	2,390	1,500	2,570	11,300	7,120	2,330	1,230	546	394	480	420	450
27	2,150	1,560	2,570	9,550	7,740	2,450	1,180	546	368	450	420	420
28	2,030	1,560	2,510	7,840	9,550	2,330	1,180	546	368	420	346	324
29	2,030	.....	2,330	6,920	9,550	2,330	1,230	513	346	420	346	368
30	2,030	.....	2,330	6,440	9,310	2,330	1,080	480	346	394	346	368
31	1,970	.....	2,390	.....	9,550	.....	1,080	480	.....	394	.....	420

NOTE.—Daily discharge determined from a well-defined discharge rating curve; discharge Oct. 1 to 4 estimated.

Monthly discharge of San Joaquin River near Friant, Cal., for 1910.

[Drainage area, 1,640 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	11,300	1,670	3,060	1.87	2.16	188,000	A.
February	1,850	1,390	1,560	.951	.99	86,600	A.
March	4,500	1,610	3,050	1.86	2.14	188,000	A.
April	11,300	2,700	6,310	3.85	4.30	375,000	A.
May	9,550	4,500	7,730	4.71	5.43	475,000	A.
June	10,300	2,330	3,990	2.43	2.71	237,000	A.
July	2,330	1,080	1,620	.988	1.14	99,600	A.
August	1,030	480	644	.393	.45	39,600	A.
September	6,150	324	869	.530	.59	51,700	A.
October	792	368	482	.294	.34	29,600	A.
November	620	324	403	.246	.27	24,000	A.
December	1,440	324	510	.311	.36	31,400	A.
The year	11,300	324	2,520	1.54	20.88	1,830,000	

SAN JOAQUIN RIVER AT HERNDON, CAL.

This station is at the Southern Pacific Railroad bridge, in sec. 31, T. 12 S., R. 19 E., about 12 miles northwest of Fresno and 20 miles below Friant. In 1879 the engineering department of the Southern Pacific Co. set a staff gage on the old trestle bridge, which was used for the regular gaging station established at the beginning of 1895. In 1899 the trestle was replaced by a steel bridge, to the center pier of which a new vertical staff gage was placed at the datum of the old gage. Meter measurements were discontinued at the end of 1901, because of the continual change in the section due to shifting sand. Since that date only a gage record has been kept.

Gage records will no longer be published for this station, since without frequent discharge measurements they do not accurately indicate the discharge.

TULARE LAKE BASIN.

GENERAL FEATURES.

The Tulare Lake basin is situated near the south end of the San Joaquin Valley and embraces that part of the valley bounded by the Kings River delta at the north and the Kern River delta at the south.

Its lowest area lies in the trough of the valley and for several hundred years has been covered most of the time by a shallow freshwater lake, the depth and extent of which have fluctuated with the season and the caprice of the delta rivers supplying it. Probably within the last hundred years the entire flow of Kern, Tule, and Kaweah rivers has entered this lake and a large part, if not all, of that of Kings River; but at the present time only the Kaweah and the Tule, south of Kings and north of Kern River, are wholly tributary

to the Tulare basin. At high stages Kings River discharges in part into this basin, and at times overflow may reach it from the Kern basin at the south.

TULARE LAKE IN KINGS COUNTY, CAL.

Tulare Lake is about 30 miles directly south of Fresno and 40 miles northwest of Bakersfield. The lake is roughly rectangular in shape and its greatest length is from northwest to southeast. In November, 1907, when its margin was carefully determined, the lake had an area of about 274 square miles, a maximum depth of 12.4 feet, an average length of 20 miles, and a width of 13.5 miles; the water's edge was 3 miles from the town of Corcoran, and the water surface about 12 feet below. The lake surface reached its greatest height in the summer of 1907, when it had a maximum depth of nearly 14 feet. Since July, 1907, it has been gradually subsiding.[1]

The lake bed resembles a flat saucer. The flat, level area in the bottom has an elevation of approximately 180 feet above mean sea level and covers about 55 square miles. The lowest point on the crest of the delta ridge to the north is about 27 feet higher than the bottom of the lake. Natural overflow will not occur, therefore, until the lake has a maximum depth of nearly 30 feet and an area of nearly 1,000 square miles.

During 1906 and a part of 1907 a record of the stage of the lake was kept by means of a Government staff gage located near the entrance of Kings River near Lemoore, Cal., at the middle of sec. 4, T. 21 S., R. 20 E., M. D. B. and M. The zero of the gage was at an elevation of 175.1 feet above mean sea level, or 4 feet below the bottom of the lake (elevation 179.1 feet). On May 11, 1907, a staff gage was set near Corcoran, Cal., referred to the same datum and used until July 30, 1909.

On July 28, 1910, a vertical staff gage, in two sections, was installed on the section line just south of the corner to secs. 27, 28, 33, and 34, T. 20 S., R. 20 E., about 10 miles south of Lemoore near Stratford post office. The datum on this gage is 171.0 feet above sea level.

All published gage records have been reduced to show the actual depth of the water on the lowest point of the lake bed.

Below is the gage record, showing the actual depth of the water in the lowest point of the lake bed, for 1910.

[1] The fluctuations in level of Tulare Lake are described in Water-Supply Paper U. S. Geol. Survey No. 271, 1911, pp. 171–174.

Daily gage height, in feet, of Tulare Lake in Kings County, Cal., for 1910.

[Mrs. J. E. Sanderson, observer.]

Day.	May.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	May.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			10.8				9.5	16			10.5	9.95	9.7		
2						9.6		17							
3								18							9.4
4			10.8		9.85			19						9.55	
5				10.2			9.4	20			10.4		9.65		
6						9.6		21		11.1					9.35
7								22							
8					9.8		9.3	23					9.6	9.55	
9			10.65					24			10.4	10.0			
10				10.0		9.55		25							
11								26					9.6		
12					9.75			27				9.95		9.5	9.35
13			10.6					28	12.3	10.95	10.3				
14								29							
15						9.55	9.25	30				9.9	9.6		
								31							

KERN RIVER BASIN.

GENERAL FEATURES.

The Kern River basin, the largest and most southern of all the areas tributary to the San Joaquin Valley from the Sierra, also extends farther east than any of the other basins and differs from them in that its main axis is north and south instead of east and west. It is long and comparatively narrow, and lies west of the main high Sierra divide, which separates it from the basins of Kaweah and Tule rivers and southern foothill streams at the west. It is separated from Kings River basin at the north by a cross range about 15 miles long, known as the Kings-Kern divide. To the east of this basin is the southern part of Owens Valley basin and the rough arid region south of Owens Lake and north of the Mohave Desert. The basin is about 85 miles long and 25 to 30 miles wide.

Kern River has its source in numerous glacial lakes nestling in the shadow of many high peaks on the main Sierra divide and on the Kings-Kern and the Great Western divides. The main stream flows directly southward for about 70 miles, then southwestward to the mouth of its canyon, a few miles northeast of Bakersfield, where it enters Kern basin, at the southern end of the San Joaquin Valley. No water from Kern River has reached the San Joaquin in recent years. The total length of Kern River from its source to Bakersfield is about 140 miles. Its total drainage area above the valley rim is about 2,570 square miles.

The chief tributary of Kern River is South Fork. Above the point of confluence the two streams have about equal lengths and drainage areas, and are parallel to each other and to the marginal rims. Each receives many short tributaries from the east and the west. The most important ones, however, Big Arroyo and Rattlesnake creeks and

Little Kern River from the west, and Gold Trout Creek from the east, enter the main stream above North Fork.

KERN RIVER AT ISABELLA, CAL.

This station was established October 5, 1910, at the wagon bridge about half a mile north of Isabella, in the SW. ¼ sec. 17, T. 26 S., R. 33 E.

Cowell Creek enters about 6 miles above and the South Fork joins the main river one-half mile below the station. Several small canals take water for irrigation above Isabella. To determine the total discharge of the river it is necessary to add the flow of the Kern River Power Co.'s canal. The intake of this canal is one-fourth mile below Kernville and about 3½ miles above the station.

The gage is a vertical staff fastened to a large cottonwood tree on the left bank. Discharge measurements are made from the bridge 100 feet above the gage.

The right bank is high; the left bank is overflowed during extreme high water. The channel is composed of gravel and cobblestones and appears permanent.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Kern River at Isabella, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 5	J. E. Stewart			0.70	*a* 1.0
Nov. 21[b]	H. J. Tompkins	10.5	6.2	.74	5.1

a Estimated. *b* Made by wading.

Daily gage height, in feet, of Kern River at Isabella, Cal., for 1910.

[Chas. T. Shook, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		0.8		11				21			
2		.8		12		0.8	0.7	22	1.0		
3				13	0.8	.8		23	*a* 2.0	0.8	
4				14	.8	.8	.7	24			
5	0.7			15		.8		25		.8	
6	.7			16			.7	26		.8	
7				17		.8	.7	27			
8	.7	.8		18				28	.8		
9		.8	0.7	19	1.0	.8	.7	29	.8		
10	.7			20	1.0		.7	30			
								31			

a Rise caused by water being turned out of Kern River Power Co. Canal.

KERN RIVER NEAR BAKERSFIELD, CAL.

This station, which has been maintained by the Kern County Land Co. to furnish a basis for the equitable division of the water of Kern River between different appropriators, is located at the mouth of the lower canyon, about 5 miles northeast of Bakersfield, at what is known as the "first point of measurement," in sec. 2, T. 29 S., R. 28 E. It was established September 29, 1893, by Walter James, chief engineer of the Kern County Land Co.

No tributaries enter below the station and only a few unimportant ones for 50 miles above.

Water diverted for power development above the station is returned to the river. Except for local irrigation in the valleys around Kernville no water is diverted for irrigation above the station. Below the point of measurement, however, the total flow of the river, except at flood stages, is diverted by the Kern County Land Co. and the Miller & Lux interests, which own all the water rights on lower Kern River.

The gage height record is obtained by an automatic water-stage register. Discharge measurements are made from the footbridge near the gage.

Determinations of daily discharge are published as furnished by the Kern County Land Co. through its engineer, A. K. Warren. Frequent discharge measurements are made and the record is excellent.

Daily discharge, in second-feet, of Kern River near Bakersfield, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,323	882	955	1,137	1,954	2,453	805	577	298	278	332	301
2	3,270	880	1,038	1,180	1,910	2,397	745	561	291	270	331	285
3	2,036	831	1,136	1,229	1,889	2,210	691	544	294	267	334	309
4	1,571	827	1,211	1,333	1,888	1,980	694	516	293	268	339	321
5	1,318	881	1,306	1,397	1,812	1,833	713	486	289	256	341	359
6	1,195	889	1,397	1,446	1,722	1,754	621	465	276	243	337	353
7	1,143	854	1,415	1,413	1,708	1,616	557	444	262	249	332	321
8	1,136	881	1,459	1,371	1,845	1,479	546	417	252	250	334	327
9	1,166	883	1,520	1,420	2,016	1,377	576	397	255	252	334	325
10	1,125	886	1,534	1,545	2,201	1,346	611	394	251	253	332	320
11	1,083	879	1,513	1,663	2,219	1,389	627	377	248	268	338	319
12	1,045	854	1,505	1,663	2,154	1,489	642	390	248	261	336	336
13	993	872	1,536	1,547	2,139	1,400	628	416	248	297	330	354
14	993	853	1,562	1,490	2,261	1,311	634	392	260	315	326	334
15	1,002	914	1,599	1,519	2,236	1,268	631	393	282	328	322	319
16	972	938	1,439	1,612	2,338	1,212	606	383	320	329	313	312
17	984	913	1,445	1,796	2,336	1,124	582	364	339	354	305	320
18	907	875	1,526	1,782	2,147	1,083	549	350	375	370	302	320
19	871	841	1,614	1,942	2,071	1,065	908	341	353	370	297	312
20	896	866	1,679	2,043	2,059	1,029	1,095	334	334	378	294	335
21	881	925	1,694	2,078	2,008	1,003	987	332	312	378	293	334
22	888	863	1,540	2,031	1,955	988	883	330	302	361	295	337
23	966	909	1,450	2,078	2,040	957	795	333	302	344	307	339
24	943	901	1,361	2,145	2,079	941	734	347	298	341	309	340
25	964	888	1,285	2,188	2,111	921	679	351	288	346	302	340
26	907	882	1,229	2,162	2,034	905	624	342	289	341	307	341
27	887	881	1,195	2,255	2,004	908	594	333	287	331	302	326
28	898	910	1,226	2,257	2,194	897	593	338	282	329	290	309
29	907	.....	1,205	2,121	2,284	881	654	331	270	323	298	309
30	914	.....	1,178	2,026	2,366	848	612	323	276	312	308	305
31	888	.....	1,142	.....	2,422	.....	584	307	.....	307	.....	321

NOTE.—Record of daily discharge furnished by the Kern County Land Co., A. K. Warren, engineer in charge.

Monthly discharge of Kern River near Bakersfield, Cal., for 1910.

[Drainage area, 2,345 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	3,323	871	1,200	0.512	0.59	73,800
February	938	827	881	.376	.39	48,900
March	1,694	955	1,380	.588	.68	84,800
April	2,257	1,137	1,730	.738	.82	103,000
May	2,422	1,708	2,080	.887	1.02	128,000
June	2,453	848	1,340	.571	.64	79,700
July	1,095	546	684	.292	.34	42,100
August	577	307	394	.168	.19	24,200
September	375	248	289	.123	.14	17,200
October	378	243	309	.132	.15	19,000
November	341	290	317	.135	.15	18,900
December	359	285	325	.139	.16	20,000
The year	3,323	243	910	.388	5.27	660,000

NOTE.—Monthly discharge computed by the Geological Survey from the daily discharge determined by the Kern County Land Co.

SOUTH FORK OF KERN RIVER AT ISABELLA, CAL.

This station, which is located at the highway bridge at Isabella, in the NW. ¼ sec. 20, T. 26 S., R. 33 E., was established October 5, 1910.

Fay Creek and Kelso Creek enter about 10 miles above the station and the South Fork joins the main river about half a mile below Isabella. The station is below all diversions and the low-water flow is entirely used for irrigation. Twenty-eight ditches, ranging in capacity from 8 to 40 second-feet, divert water from this stream for irrigation in South Fork Valley. The upper ditches head about 20 miles above the mouth of the river.

The gage is a vertical staff fastened to the piling of the middle bent of the bridge.

Discharge measurements are made from the bridge.

Both banks are high and wooded and not subject to overflow. The channel, which is composed of sand, is somewhat shifting and the current is moderately swift.

This station is maintained in cooperation with the United States Forest Service.

No estimate of daily or monthly discharge has been prepared for 1910.

Discharge measurements of South Fork of Kern River at Isabella, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 5	J. E. Stewart	20	7.9	0.40	9.7
Nov. 21	H. J. Tompkins	33	26	.50	25

NOTE.—Measurements made by wading.

Daily gage height, in feet, of South Fork of Kern River at Isabella, Cal., for 1910.

[Chas. T. Shook, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		0.6		11				21			
2		.6		12		0.5	0.5	22	0.6		
3		.6		13	0.5	.5		23	.6	0.5	
4				14	.5	.5	.5	24			
5	0.4			15		.5		25		.4	
6	.4			16			.5	26		.5	
7				17		.5	.5	27			
8	.4	.5		18				28	.6		
9		.5	0.5	19	.6	.5	.5	29			
10	.4			20	.6		.5	30			
								31	.6		

WHITE RIVER BASIN.

DEER CREEK AT HOT SPRINGS, CAL.

White River and Deer Creek, its principal tributary, which drain an area in Tulare County south of Tule River, rise on the Greenhorn Mountains, a spur of the Sierra Nevada, in the Sequoia National Forest and flow westward. At flood stages their waters reach the lower part of the valley immediately south of Tulare Lake; during the low-water season both streams sink into the sand near the foothills.

Several ranches divert a small amount of water from both streams for irrigation, but as the amount of tillable land is small, the agricultural products are sufficient only to supply the local demand.

On Deer Creek, in the vicinity of Hot Springs, hot sulphur water issues from several large springs which have become noted for their curative properties.

The gaging station, which is located half a mile below Hot Springs post office in the Sequoia National Forest, and about 2½ miles above the mouth of Tyler Creek, was established October 7, 1910.

The gage is a vertical staff fastened to a tree on the left bank of the stream, 100 feet above the highway bridge from which discharge measurements are made at high water.

The banks are high and there is but one channel at all stages. The channel is composed of sand, gravel, and bowlders, and conditions favor good results.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

The following discharge measurement was made by Stewart and Tompkins by wading 200 feet below gage:

October 7, 1910; width, 6.3 feet; area, 5 square feet; gage height, 0.39 foot; discharge, 2.2 second-feet.

Daily gage height, in feet, of Deer Creek at Hot Springs, Cal., for 1910.

[A. B. Patterson, forest supervisor, Sequoia National Forest, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1				11	0.50			21			
2				12	.49	0.48		22			
3		0.48	0.70	13	.48	.50		23			0.55
4		.50	.58	14				24			
5		.50	.53	15				25			
6		.48		16				26			
7	0.39			17				27			
8				18				28			
9				19				29			
10				20				30			
								31			.51

TULE RIVER BASIN.

GENERAL FEATURES.

Tule River drains a small, somewhat rectangular area lying south of the Kaweah basin, west of the Kern basin, and north of the Deer Creek basin. Its length north and south averages about 25 miles and its width averages about 15 miles. The total drainage area above the rim of the valley is about 370 square miles.

Tule River rises at an altitude of about 9,000 feet above sea level. The main stream is formed by the junction of North and Middle forks about 1 mile above Daunt post office and about 15 miles northeast of Portersville. It takes a southwesterly course to the point where it leaves the foothills about 5 miles east of Portersville, and has a length of about 30 miles. South Fork joins the main stream about 8 miles below Daunt. The flood water passes westward through old channels in the river's alluvial fan to Tulare Lake, which it enters south of Corcoran.

TULE RIVER NEAR PORTERSVILLE, CAL.

This station, which is located in the NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 25, T. 21 S., R. 28 E., M. D. B. and M., 100 feet below the wagon bridge near McFarland's ranch, about 1 mile above the mouth of South Fork, about 8 miles east of Portersville, and about 9 miles below the junction of North and Middle forks, was established April 8, 1901.

A few small irrigation ditches divert water above the point of measurement. Below the station canals divert water for use chiefly in irrigating citrus fruits in the vicinity of Portersville. The acquired water rights exceed the minimum flow of the stream.

The staff gage is in two sections on the right bank. No change has ever been made in the gage datum.

Discharge measurements are made from the bridge about 100 feet above the gage.

The channel is practically permanent and the velocity moderate. Conditions favor accuracy of discharge data. The 1910 rating curve is well defined and the record may be considered excellent.

Discharge measurements of Tule River near Portersville, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 10	J. E. Stewart	66	130	2.10	173
Mar. 22	W. B. Clapp	69	130	2.34	224
Apr. 7	J. E. Stewart	69	126	2.30	210
7	do	72	147	2.30	217
May 11	do	70	138	2.18	189
June 2[a]	do	53	97	1.62	90
July 11[a]	W. V. Hardy	45	43	.88	19
11[a]	do	35	23	.88	20
Aug. 20[a]	J. E. Stewart	15	8.6	.58	5.8
Oct. 9[a]	do	15	11	.75	11

[a] Measurement made by wading.

Daily gage height, in feet, of Tule River near Portersville, Cal., for 1910.

[R. W. McFarland, Martha Brough, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.55	2.5	2.1	2.3	2.3	1.6	1.05	0.7	0.6	0.7	0.95	1.1
2	4.5	2.3	2.2	2.3	2.2	1.6	1.05	.7	.65	.7	1.0	1.1
3	3.2	2.2	2.2	2.3	2.2	1.55	1.05	.7	.65	.7	1.0	1.1
4	3.0	2.2	2.15	2.35	2.2	1.55	1.0	.7	.65	.7	1.05	1.6
5	2.85	2.2	2.1	2.3	2.1	1.5	1.0	.7	.65	.7	1.05	1.45
6	2.7	2.2	2.35	2.3	2.1	1.5	1.0	.65	.65	.7	1.05	1.4
7	2.6	2.2	2.35	2.3	2.1	1.45	.95	.65	.7	.7	1.05	1.3
8	2.55	2.15	2.35	2.3	2.1	1.45	.95	.65	.7	.7	1.05	1.2
9	2.5	2.15	2.4	2.3	2.15	1.4	.95	.65	.7	.7	1.05	1.2
10	2.4	2.15	2.35	2.3	2.15	1.4	.8	.65	.7	.75	1.05	1.2
11	2.3	2.1	2.3	2.5	2.15	1.35	.9	.6	.7	.85	1.05	1.2
12	2.25	2.1	2.25	2.5	2.15	1.3	.85	.6	.7	1.05	1.05	1.2
13	2.2	2.1	2.25	2.4	2.15	1.25	.8	.6	.75	1.05	1.05	1.2
14	2.2	2.1	2.8	2.4	2.15	1.3	.8	.6	.8	1.1	1.05	1.25
15	2.5	2.1	2.4	2.4	2.1	1.3	.8	.55	.8	1.1	1.05	1.25
16	3.0	2.1	2.3	2.4	2.0	1.3	.8	.55	.9	1.2	1.05	1.2
17	2.7	2.1	2.3	2.4	2.0	1.25	.8	.55	.85	1.15	1.1	1.2
18	2.5	2.1	2.3	2.4	2.0	1.25	.9	.55	.85	1.1	1.1	1.2
19	2.3	2.1	2.3	2.4	1.95	1.25	1.0	.6	.8	1.1	1.1	1.2
20	2.2	2.1	2.35	2.4	1.9	1.2	.9	.6	.8	1.05	1.1	1.4
21	2.2	2.1	2.35	2.5	1.9	1.2	.85	.6	.8	1.0	1.1	1.3
22	2.3	2.05	2.35	2.45	1.9	1.15	.8	.6	.75	1.0	1.1	1.3
23	2.3	2.05	2.35	2.4	1.9	1.1	.8	.6	.7	1.0	1.1	1.3
24	2.5	2.05	2.35	2.35	1.85	1.1	.8	.6	.7	1.0	1.1	1.3
25	2.45	2.05	2.3	2.35	1.85	1.1	.8	.6	.7	1.0	1.1	1.3
26	2.4	2.0	2.3	2.35	1.8	1.1	.75	.6	.7	1.0	1.15	1.25
27	2.35	2.05	2.3	2.35	1.75	1.1	.75	.6	.7	.95	1.15	1.25
28	2.3	2.1	2.3	2.35	1.7	1.05	.75	.6	.7	.95	1.15	1.25
29	2.3	.....	2.3	2.3	1.65	1.05	.7	.6	.7	.95	1.15	1.2
30	2.3	.....	2.3	2.3	1.6	1.05	.7	.6	.7	.95	1.1	1.2
31	2.3	.....	2.3	.....	1.6	.....	.7	.6	.....	.95	.....	1.2

Daily discharge, in second-feet, of Tule River near Portersville, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,940	260	173	214	214	88	30	9	6	9	23	34
2	1,170	214	193	214	193	88	30	9	7.5	9	26	34
3	483	193	193	214	193	82	30	9	7.5	9	26	34
4	410	193	183	225	193	82	26	9	7.5	9	30	88
5	360	193	173	214	173	75	26	9	7.5	9	30	70
6	314	193	225	214	173	75	26	7.5	7.5	9	30	64
7	286	193	225	214	173	70	23	7.5	9	9	30	53
8	273	183	225	214	173	70	23	7.5	9	9	30	43
9	260	183	236	214	183	64	23	7.5	9	9	30	43
10	236	183	225	214	183	64	14	7.5	9	12	30	43
11	214	173	214	260	183	58	20	6	9	17	30	43
12	204	173	204	260	183	53	17	6	9	30	30	43
13	193	173	20[illegible]	236	183	48	14	6	12	30	30	43
14	193	173	344	236	183	53	14	6	14	34	30	48
15	260	173	236	236	173	53	14	5	14	34	30	48
16	410	173	214	236	154	53	14	5	20	43	30	43
17	314	173	214	236	154	48	14	5	17	38	34	43
18	260	173	214	236	154	48	20	5	17	34	34	43
19	214	173	214	236	145	48	26	6	14	34	34	43
20	193	173	225	236	136	43	20	6	14	30	34	64
21	193	173	225	260	136	43	17	6	14	26	34	53
22	214	164	225	248	136	38	14	6	12	26	34	53
23	214	164	225	236	136	34	14	6	9	26	34	53
24	260	164	225	225	128	34	14	6	9	26	34	53
25	248	164	214	225	128	34	14	6	9	26	34	53
26	236	154	214	225	119	34	12	6	9	26	38	48
27	225	164	214	225	111	34	12	6	9	23	38	48
28	214	173	214	225	103	30	12	6	9	23	38	48
29	214	.....	214	214	96	30	9	6	9	23	38	43
30	214	.....	214	214	88	30	9	6	9	23	34	43
31	214	.....	214	.....	88	.....	9	6	.....	23	.....	43

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Tule River near Portersville, Cal., for 1910.

[Drainage area, 266 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	1,940	193	343	1.29	1.49	21,100	A.
February	260	154	180	.677	.70	10,000	A.
March	344	173	217	.816	.94	13,300	A.
April	260	214	229	.861	.96	13,600	A.
May	214	88	154	.579	.67	9,470	A.
June	88	30	53.5	.201	.22	3,180	A.
July	30	9	18.1	.068	.08	1,110	A.
August	9	5	6.60	.025	.03	406	A.
September	20	6	10.6	.040	.04	631	A.
October	43	9	22.2	.084	.10	1,360	A.
November	38	23	31.9	.120	.13	1,900	A.
December	88	34	48.5	.182	.21	2,980	A.
The year	1,940	5	109	.410	5.57	79,000	

NOTE.—This table does not include the small diversions for irrigation made above the gage. Hence the discharge per square mile and the run-off in inches are subject to error during irrigating season.

SOUTH FORK OF TULE RIVER NEAR SUCCESS, CAL.

This station, which is located at the Indian school on the Tule Indian reservation, 7 miles southeast of Success, was established October 10, 1910.

Rocky Creek enters about 2 miles above and the South Fork joins the main river about 10 miles below the gage. Thirteen small ditches, with an aggregate capacity of about 11 second-feet, divert water from the South Fork and tributaries above the station for irrigation on the reservation. The South Tule ditch heads about 4 miles below the station.

The gage is a vertical staff fastened to an alder on the left bank directly opposite the Indian school.

Discharge measurements are made by wading at medium and low stages. A car and cable for high-stage measurements have not yet been installed.

The bed of the stream, which is composed of bowlders, is rough, and the course of the channel is probably permanent. The current is swift at medium and high stages. Both banks are high and wooded and not liable to overflow.

This station is maintained in cooperation with the United States Office of Indian Affairs.

No estimates of daily or monthly discharge have been prepared for 1910.

The following discharge measurement was made by Stewart and Tompkins by wading about ½ mile below gage:

October 11, 1910: Width, 9 feet; area, 9 square feet; gage height, 0.33 feet; discharge, 2.9 second-feet.

Daily gage height, in feet, of South Fork of Tule River near Success, Cal., for 1910.

[Allan Bowdish, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	0.50	0.71	11	0.33	0.50	0.50	21	0.42	0.66	0.94
2	.....	.49	.71	12	.26	.59	.50	22	.42	.64	.92
3	.....	.50	.71	13	.24	.64	.52	23	.42	.63	.80
4	.....	.62	.85	14	.24	.62	.54	24	.43	.63	.71
5	.....	.64	.80	15	.23	.61	.54	25	.44	.68	.65
6	.....	.59	.68	16	.60	.60	.55	26	.43	.70	.64
7	.....	.60	.57	17	.56	.60	.56	27	.43	.72	.64
8	.....	.58	.51	18	.52	.60	.55	28	.42	.72	.63
9	.....	.55	.50	19	.48	.62	.54	29	.42	.70	.60
10	0.21	.51	.48	20	.43	.66	.92	30	.42	.70	.57
								31	.43	.....	.56

KAWEAH RIVER BASIN.

GENERAL FEATURES.

Kaweah River drains an area comprising about 715 square miles, lying on the western slope of the Sierra in the northern part of Tulare County, south and west of the Kings River basin, north of the Tule River basin, and west of the upper Kern River basin.

The main stream is formed 10 or 15 miles above the head of its delta by the confluence of East and Middle forks, which rise in numerous

small lakes nestling among high peaks on or near the divide, at an altitude of about 12,000 feet above sea level, and its course is southwestward throughout its length. Below the foothills it divides into several distributaries which cross the delta fan and enter Tulare Lake near Corcoran. Its total length above the delta is about 45 miles.

KAWEAH RIVER NEAR THREE RIVERS, CAL.

This station, which is located in the SE. ¼ sec. 27, T. 17 N., R. 28 E., M. D. B. and M., about 1 mile southwest of Three Rivers post office and about one-fourth mile back of J. O. Carter's ranch house on the wagon road from Lemon Cove to Three Rivers, about three-fourths of a mile below the mouth of the South Fork and 3 miles below the mouth of the North Fork was established April 29, 1903.

No important tributaries enter below the point of measurement.

Some water is diverted above the station for power, particularly on Middle and East forks, but it is returned to the stream above Three Rivers. A few small ditches divert water for local irrigation and domestic uses in the small valleys above Three Rivers. The acquired water-rights on this stream probably exceed low-water flow.

The staff gage, the datum of which has not been changed since the station was established, is in two sections.

Discharge measurements are made from a cable at the gage.

The conditions for obtaining accurate discharge data are fairly good. The stream is confined to its channel except at very high stages, when the right bank is overflowed somewhat. The bed, though composed of fine gravel and sand, is not subject to much change. The current is somewhat sluggish at very low stages and rather swift at high stages, though not excessively so.

The 1910 rating curve is well defined and the record may be considered good.

Discharge measurements of Kaweah River near Three Rivers, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 9	J. E. Stewart	160	406	5.70	445
Apr. 6	....do	160	508	6.35	920
May 12	....do	166	599	6.92	1,560
June 1	....do	165	563	6.71	1,230
July 12	W. V. Hardy	133	296	5.10	185
Aug. 22[a]	J. E. Stewart	38	82	4.40	50
Oct. 12[a]	Stewart and Tompkins	50	72	4.80	134
Nov. 14[a]	H. J. Tompkins	48	56	4.60	80

[a] Measurement made by wading below the gage.

Daily gage height, in feet, of Kaweah River near Three Rivers, Cal., for 1910.

[J. O. Carter, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.8	6.0	5.85	6.2	6.8	6.7	5.3	4.75	4.4	4.3	4.45	4.5
2	7.05	5.75	5.95	6.25	6.8	6.6	5.2	4.65	4.4	4.3	4.5	4.5
3	6.6	5.8	6.1	6.3	6.8	6.45	5.2	4.6	4.4	4.3	4.5	4.6
4	6.3	5.8	6.1	6.4	6.7	6.35	5.2	4.6	4.4	4.3	4.5	5.1
5	6.2	5.75	6.2	6.5	6.5	6.3	5.1	4.6	4.4	4.3	4.55	4.8
6	6.15	5.75	6.2	6.4	6.6	6.2	5.1	4.55	4.35	4.3	4.55	4.7
7	6.1	5.75	6.2	6.35	6.8	6.1	5.1	4.5	4.35	4.3	4.5	4.7
8	6.0	5.7	6.3	6.4	6.85	6.05	5.1	4.5	4.35	4.3	4.5	4.65
9	5.95	5.7	6.3	6.5	7.05	6.0	5.05	4.5	4.3	4.3	4.5	4.65
10	5.9	5.7	6.25	6.6	6.9	6.0	5.1	4.5	4.3	4.3	4.5	4.65
11	5.85	5.7	6.25	6.55	7.0	6.0	5.0	4.5	4.3	4.45	4.5	5.3
12	5.8	5.7	6.25	6.5	7.0	6.0	5.05	4.5	4.3	4.8	4.6	5.15
13	5.8	5.75	6.25	6.4	7.1	6.15	5.0	4.45	4.3	4.65	4.6	4.95
14	5.8	5.8	6.45	6.5	7.1	5.9	5.0	4.45	4.35	4.6	4.6	4.8
15	5.9	5.8	6.25	6.6	7.1	5.75	5.0	4.45	4.6	4.7	4.55	4.75
16	6.65	5.7	6.1	6.75	7.05	5.7	4.9	4.4	4.6	4.8	4.55	4.7
17	6.2	5.7	6.2	6.9	6.9	5.8	4.9	4.4	4.6	4.7	4.55	4.65
18	6.0	5.7	6.35	7.0	6.8	5.7	5.6	4.4	4.5	4.8	4.55	4.65
19	5.9	5.7	6.45	7.1	6.8	5.7	5.7	4.4	4.45	4.8	4.6	4.65
20	5.9	5.7	6.4	7.1	6.8	5.65	5.3	4.4	4.4	4.75	4.6	4.7
21	5.9	5.65	6.3	7.0	6.7	5.65	5.1	4.4	4.4	4.7	4.6	4.7
22	5.95	5.65	6.35	7.1	6.8	5.6	5.0	4.4	4.4	4.65	4.55	4.65
23	6.1	5.6	6.3	7.1	6.8	5.55	4.95	4.4	4.35	4.65	4.55	4.7
24	6.0	5.6	6.2	7.15	6.8	5.5	4.9	4.4	4.35	4.6	4.55	4.65
25	5.95	5.7	6.2	7.3	6.75	5.55	4.85	4.4	4.25	4.6	4.55	4.65
26	5.9	5.7	6.1	7.1	6.7	5.55	4.9	4.4	4.35	4.55	4.6	4.65
27	5.9	5.75	6.1	7.2	6.8	5.55	4.9	4.4	4.3	4.5	4.6	4.6
28	5.9	5.75	6.05	6.95	6.8	5.5	4.9	4.4	4.3	4.5	4.6	4.6
29	5.9	.....	6.0	7.0	6.8	5.4	4.8	4.4	4.3	4.5	4.55	4.6
30	5.9	.....	6.1	6.9	6.8	5.3	4.75	4.4	4.3	4.5	4.5	4.6
31	5.9	.....	6.1	.....	6.8	.....	4.75	4.4	.....	4.5	.....	4.6

Daily discharge, in second-feet, of Kaweah River near Three Rivers, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,850	636	538	785	1,360	1,260	271	110	50	39	56	63
2	1,660	478	603	828	1,360	1,160	235	90	50	39	63	63
3	1,160	507	710	870	1,360	1,010	235	80	50	39	63	80
4	870	507	710	960	1,260	915	235	80	50	39	63	202
5	785	478	785	1,060	1,060	870	202	80	50	39	72	121
6	748	478	785	960	1,160	785	202	72	44	39	72	99
7	710	478	785	915	1,360	710	202	63	44	39	63	99
8	636	449	870	960	1,420	673	202	63	44	39	63	90
9	603	449	870	1,060	1,660	636	188	63	39	39	63	90
10	570	449	828	1,160	1,480	636	202	63	39	39	63	90
11	538	449	828	1,100	1,600	636	173	63	39	56	63	271
12	507	449	828	1,060	1,600	636	188	63	39	121	80	218
13	507	478	828	960	1,720	748	173	56	39	90	80	160
14	507	507	1,010	1,060	1,720	570	173	56	44	80	80	121
15	570	507	828	1,160	1,720	478	173	56	80	99	72	110
16	1,200	449	710	1,310	1,660	449	146	50	80	121	72	99
17	785	449	785	1,480	1,480	507	146	50	80	99	72	90
18	636	449	915	1,600	1,360	449	399	50	63	121	72	90
19	570	449	1,010	1,720	1,360	449	449	50	56	121	80	90
20	570	449	960	1,720	1,360	424	271	50	50	110	80	99
21	570	424	870	1,600	1,260	424	202	50	50	99	80	99
22	603	424	915	1,720	1,360	399	173	50	50	90	72	90
23	710	399	870	1,720	1,360	376	160	50	44	90	72	99
24	636	399	785	1,780	1,360	352	146	50	44	80	72	90
25	603	449	785	1,990	1,310	376	134	50	34	80	72	90
26	570	449	710	1,720	1,260	376	146	50	44	72	80	90
27	570	478	710	1,850	1,360	376	146	50	39	63	80	80
28	570	478	673	1,440	1,360	352	146	50	39	63	80	80
29	570	.....	636	1,600	1,360	310	121	50	39	63	72	80
30	570	.....	710	1,480	1,360	271	110	50	39	63	63	80
31	570	.....	710	.....	1,360	.....	110	50	.....	63	.....	80

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Kaweah River near Three Rivers, Cal., for 1910.

[Drainage area, 520 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	4,850	507	823	1.58	1.82	50,600	B.
February	636	399	466	.896	.93	25,900	A.
March	1,010	538	792	1.52	1.75	48,700	A.
April	1,990	785	321	.617	.69	19,100	A.
May	1,720	1,060	1,410	2.71	3.12	86,700	A.
June	1,260	271	587	1.13	1.26	34,900	A.
July	449	110	195	.375	.42	12,000	A.
August	110	50	59.9	.115	.13	3,680	B.
September	80	34	48.4	.093	.10	2,880	B.
October	121	39	72.1	.139	.16	4,430	B.
November	80	56	71.2	.137	.15	4,240	B.
December	271	63	107	.206	.24	6,580	A.
The year	4,850	34	414	.796	10.77	300,000	

NOTE.—Diversions for irrigation, the total of which is estimated at about 20 second-feet, are made on North Fork of Kaweah. Hence discharge per square mile and run-off in inches are subject to error during the irrigating season.

NORTH FORK OF KAWEAH RIVER AT KAWEAH, CAL.

This station, which is located at the highway bridge half a mile above Kaweah and about 2 miles above the mouth of the North Fork, was established October 12, 1910.

Sheep Creek enters 2½ miles above and Manikin Creek one-fourth mile below the gage. Several small ditches divert water for irrigation above the station. The total amount of water used is estimated at about 20 second-feet.

The vertical staff gage is fastened to the right abutment of the bridge from which discharge measurements are made.

Both banks are high and wooded and not subject to overflow. The bed of the stream is bed rock and sand. At low water the current is sluggish at the bridge.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of North Fork of Kaweah River at Kaweah, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 13	Stewart and Tompkins	14	17	0.80	17
Nov. 11	H. J. Tompkins	13	14	.66	12
12	....do	14	16	.73	13

NOTE.—Measurements made by wading about 1 mile below gage.

Daily gage height, in feet, of North Fork of Kaweah River at Kaweah, Cal., for 1910.

[G. W. Purdy, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	0.65	.....	11	.....	0.65	1.52	21	0.70	0.72	.....
2	.....	.62	.....	12	0.93	.74	.....	22	.65	.....	.....
3	.....	.63	0.78	13	.80	.81	1.05	23	.63	.....	.....
4	.....	.66	1.20	14	.....	.75	.95	24	.64	.....	.....
5	.....	.69	.90	15	.....	.....	.....	25	.65	.71	.....
6	.....	.65	.....	16	.....	.....	.90	26	.62	.82	0.83
7	.....	.65	.....	17	.....	.....	.83	27	.61	.78	.82
8	.....	.66	.82	18	.....	.....	.....	28	.61	.74	.....
9	.....	.65	.80	19	.....	.....	.....	29	.61	.....	.....
10	.....	.66	.80	20	.75	.....	.....	30	.61	.73	.....
								31	.63	.....	.....

KINGS RIVER BASIN.

GENERAL FEATURES.

Kings River drains an area comprising about 1,840 square miles, lying on the western slope of the Sierra, south of the upper San Joaquin basin and north of Kaweah and upper Kern basins.

The main stream is formed well up in the mountains by the confluence of the North, Middle and South forks, which rise in numerous glacial lakelets nestling at the foot of glaciers and perpetual snow banks which protrude from the summits of high peaks on and near the crest of the Sierra. It flows southwestward to the mouth of its canyon, about 10 miles northeast of Sanger, and across its delta fan to the trough of San Joaquin Valley, about 6 miles west of Lemoore. From this point most of the low-water flow passes northwestward through Kings Slough to San Joaquin River about 3 miles north of Mendota, but most of the flood flow passes southward to Tulare Lake. The total length of the river from its source to the mouth of its canyon is about 85 miles. Besides the three forks and their tributaries, the other principal tributaries are Dinkey and Big creeks from the north and Mill Creek from the south.

KINGS RIVER NEAR SANGER, CAL.

This station, which is located in the NW. ¼ sec. 8, T. 13 S., R. 24 E., M. D. B. and M., just below a big bend in the river near the mouth of the canyon, about 15 miles northeast of Sanger and southwest of Red Mountain, was established September 3, 1895.

No tributaries enter below the station. Mill Creek enters from the south about 3 miles above the point of measurement. Big and Dinkey creeks enter from the north about 10 and 15 miles, respectively, above the station. The forks unite 20 or 25 miles above.

No water is diverted immediately above the place of measurement. Many miles above, however, a small quantity of water is diverted from tributary streams into a flume used for transporting lumber from the

mountains to Sanger. The total flow of the river at low and moderate stages is diverted into irrigation canals only a short distance below the station. The acquired water rights greatly exceed the low-water flow.

A Friez automatic water-stage register is used for obtaining gage heights at this station, because of the remarkable diurnal fluctuations of stage, especially during the spring and early summer when the snow is melting rapidly. Not uncommonly the weekly record sheet shows a notably regular sinusoidal curve indicating an hourly change and a daily range of nearly 2 feet. (See fig. 1.) No change has ever been made in the gage datum.

Discharge measurements are made from a cable about 500 feet below the gage.

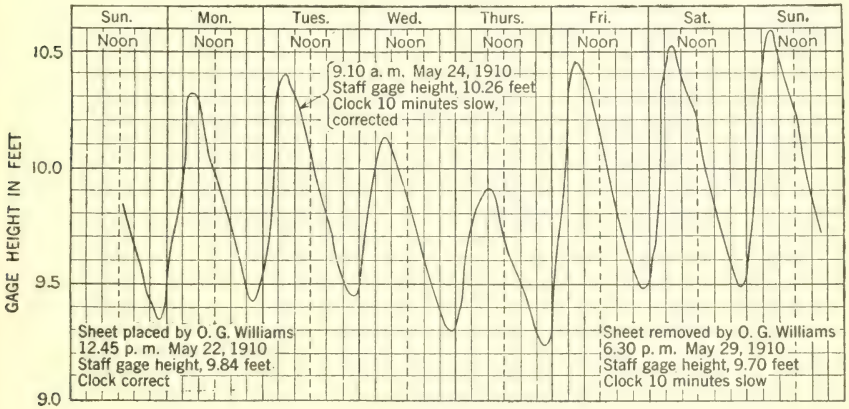


FIGURE 1.—Gage-height record of Kings River near Sanger, Cal., May 22-29, 1910.

The conditions for obtaining accurate discharge data at this station are very good. The stream is confined to its channel at all stages and the current is never too sluggish nor too swift. The channel has a gravel bottom but changes very little. The 1910 rating curve is well defined except at the lower stages and the record is excellent.

Discharge measurements of Kings River near Sanger, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 8	J. E. Stewart	154	549	5.74	1,350
Apr. 5	....do	210	965	7.98	3,940
May 13	....do	313	1,660	10.28	8,830
31	....do	315	1,690	10.40	9,100
July 9	W. V. Hardy	160	621	6.11	1,620
18	....do	202	899	7.61	3,030
Aug 23	J. E. Stewart	118	356	4.60	507
Sept. 29[a]	....do	124	295	4.20	240

[a] Measurement made by wading.

Daily gage height, in feet, of Kings River near Sanger, Cal., for 1910.

[O. G. Williams, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11.85	6.2	6.0	6.9	9.2	10.15	6.5	5.25	4.4	4.2	4.35	4.3
2	8.8	6.0	6.3	7.1	9.1	9.9	6.4	5.2	4.4	4.2	4.35	4.3
3	7.8	5.95	6.5	7.25	9.35	9.4	6.25	5.1	4.4	4.2	4.3	4.3
4	7.2	6.0	6.7	7.5	8.9	9.15	6.05	5.05	4.45	4.2	4.3	4.65
5	6.8	6.0	6.85	7.9	8.55	8.95	5.8	5.0	4.4	4.15	4.3	4.5
6	6.55	5.9	6.95	7.65	8.6	8.6	5.7	4.95	4.4	4.15	4.3	4.45
7	6.3	5.85	7.0	7.55	9.2	8.3	5.8	4.9	4.35	4.15	4.3	4.45
8	6.15	5.75	7.1	7.95	9.7	8.05	5.95	4.85	4.35	4.15	4.3	4.45
9	6.1	5.7	7.3	8.4	9.9	7.95	6.05	4.8	4.3	4.1	4.25	4.45
10	6.1	5.7	7.3	8.65	9.75	8.05	6.05	4.75	4.3	4.1	4.25	4.45
11	6.0	5.7	7.3	8.6	9.85	8.3	6.05	4.7	4.3	4.1	4.25	5.3
12	5.9	5.7	7.35	8.15	9.95	8.2	6.05	4.65	4.3	4.4	4.25	5.15
13	5.9	5.8	7.4	8.05	10.15	7.95	6.0	4.55	4.3	4.35	4.3	4.75
14	6.05	5.85	7.5	8.35	10.2	7.85	6.0	4.5	4.3	4.3	4.35	4.65
15	6.6	5.85	7.2	8.6	10.25	7.5	5.9	4.5	4.65	4.3	4.3	4.55
16	9.2	5.7	6.9	8.95	10.2	7.1	5.75	4.5	5.0	4.55	4.3	4.5
17	7.95	5.7	7.0	9.25	9.7	7.2	5.6	4.5	4.75	4.6	4.3	4.5
18	7.4	5.7	7.5	9.45	9.5	7.2	6.8	4.5	4.6	4.6	4.3	4.4
19	7.1	5.7	7.9	9.7	9.55	7.0	7.15	4.5	4.5	4.7	4.35	4.45
20	6.95	5.7	7.9	9.9	9.6	6.9	6.8	4.5	4.4	4.65	4.3	4.45
21	6.95	5.6	7.55	9.7	9.5	6.9	6.4	4.55	4.35	4.6	4.35	4.5
22	6.9	5.6	7.55	9.85	9.75	6.7	6.15	4.55	4.3	4.6	4.35	4.5
23	6.7	5.6	7.4	10.1	9.85	6.65	5.8	4.6	4.3	4.55	4.35	4.5
24	6.5	5.6	7.15	10.25	9.9	6.6	5.7	4.6	4.25	4.55	4.35	4.5
25	6.45	5.65	7.0	10.4	9.75	6.7	5.6	4.6	4.25	4.5	4.35	4.5
26	6.3	5.7	6.75	10.5	9.6	6.8	5.5	4.55	4.25	4.45	4.35	4.5
27	6.1	5.7	6.7	10.25	9.95	6.85	5.5	4.5	4.25	4.45	4.3	4.45
28	6.05	5.8	6.55	9.6	10.0	6.9	5.6	4.45	4.25	4.4	4.3	4.35
29	6.0	.....	6.55	9.5	10.05	6.8	5.5	4.45	4.3	4.4	4.3	4.35
30	6.05	.....	6.6	9.4	10.15	6.65	5.4	4.45	4.3	4.35	4.3	4.35
31	6.1	.....	6.7	.....	10.2	.....	5.3	4.4	.....	4.35	.....	4.35

Daily discharge, in second-feet, of Kings River near Sanger, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14,700	1,750	1,550	2,530	6,370	8,740	2,080	888	348	245	322	296
2	5,510	1,550	1,860	2,770	6,150	8,070	1,970	851	348	245	322	296
3	3,730	1,500	2,080	2,960	6,720	6,830	1,800	778	348	245	296	296
4	2,900	1,550	2,300	3,300	5,720	6,260	1,600	743	375	245	296	488
5	2,410	1,550	2,470	3,880	5,010	5,820	1,360	708	348	220	296	402
6	2,140	1,450	2,590	3,510	5,110	5,110	1,270	675	348	220	296	375
7	1,860	1,410	2,650	3,370	6,370	4,540	1,360	642	322	220	296	375
8	1,700	1,310	2,770	3,960	7,560	4,110	1,500	610	322	220	296	375
9	1,650	1,270	3,030	4,720	8,070	3,960	1,600	578	296	196	270	375
10	1,650	1,270	3,030	5,210	7,680	4,110	1,600	548	296	196	270	375
11	1,550	1,270	3,030	5,110	7,940	4,540	1,600	517	296	196	270	926
12	1,450	1,270	3,100	4,280	8,200	4,360	1,600	488	296	348	270	814
13	1,450	1,360	3,160	4,110	8,740	3,960	1,550	430	296	322	296	548
14	1,600	1,410	3,300	4,630	8,880	3,800	1,550	402	296	296	322	488
15	2,190	1,410	2,900	5,110	9,020	3,300	1,450	402	488	296	296	430
16	6,370	1,270	2,530	5,820	8,880	2,770	1,310	402	708	430	296	402
17	3,960	1,270	2,650	6,480	7,560	2,900	1,180	402	548	458	296	402
18	3,160	1,270	3,300	6,950	7,070	2,900	2,410	402	458	458	296	348
19	2,770	1,270	3,880	7,560	7,190	2,650	2,840	402	402	517	322	375
20	2,590	1,270	3,880	8,070	7,310	2,530	2,410	402	348	488	296	375
21	2,590	1,180	3,370	7,560	7,070	2,530	1,970	430	322	458	322	402
22	2,530	1,180	3,370	7,940	7,680	2,300	1,700	430	296	458	322	402
23	2,300	1,180	3,160	8,610	7,940	2,240	1,360	458	296	430	322	402
24	2,080	1,180	2,840	9,020	8,070	2,190	1,270	458	270	430	322	402
25	2,020	1,220	2,650	9,450	7,680	2,300	1,180	458	270	402	322	402
26	1,860	1,270	2,360	9,750	7,310	2,410	1,090	430	270	375	322	402
27	1,650	1,270	2,300	9,020	8,200	2,470	1,090	402	270	375	296	375
28	1,600	1,360	2,140	7,310	8,340	2,530	1,180	375	270	348	296	322
29	1,550	.....	2,140	7,070	8,480	2,410	1,090	375	296	348	296	322
30	1,600	.....	2,190	6,830	8,740	2,240	1,010	375	296	322	296	322
31	1,650	.....	2,300	.....	8,880	.....	926	348	.....	322	.....	322

NOTE.—Daily discharge determined from a rating curve well defined except at the lower stages.

Monthly discharge of Kings River near Sanger, Cal., for 1910.

[Drainage area, 1,740 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	14,700	1,450	2,800	1.61	1.86	172,000	A.
February	1,750	1,180	1,340	.77	.80	74,400	A.
March	3,880	1,550	2,740	1.57	1.81	168,000	A.
April	9,750	2,530	5,900	3.39	3.78	351,000	A.
May	9,020	5,010	7,550	4.34	5.00	464,000	A.
June	8,740	2,190	3,830	2.20	2.45	228,000	A.
July	2,840	926	1,550	.891	1.03	95,300	A.
August	888	348	510	.293	.34	31,400	B.
September	708	270	345	.198	.22	20,500	B.
October	517	196	333	.191	.22	20,500	B.
November	322	270	301	.173	.19	17,900	B.
December	926	296	414	.238	.27	25,500	B.
The year	14,700	196	2,300	1.32	17.97	1,670,000	

DINKEY CREEK NEAR OCKENDEN, CAL.

This station was established September 17, 1910, at the Dinkey ranger station in the Sierra National Forest, in sec. 20, T. 10 S., R. 26 E., M. D. B. and M., 9½ miles southeast of Ockenden.

Rock Creek enters 3 miles above and Bear Creek 1½ miles below the gage. A small unnamed tributary joins the stream at Dinkey Meadows 100 feet above the station.

The vertical staff gage is on the right bank about 400 feet below the ranger's station.

Discharge measurements are made by wading at low and medium stages. A car and cable for making gagings at high water will be installed.

There is but one channel at all stages as both banks are high. The bed of the stream is composed of gravel and small bowlders and the current is swift. Conditions are fairly satisfactory for making accurate measurements.

This station is maintained in cooperation with the United States Forest Service.

No gage heights were observed in 1910, and no estimates of daily or monthly discharge have been prepared.

Discharge measurements of Dinkey Creek near Ockenden, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 19	J. E. Stewart	26	19	0.28	2.8
Nov. 2	H. J. Tompkins	26	22	.33	5.0

NOTE.—Measurements made by wading.

The following additional gage heights were observed by J. E. Stewart: September 20, 0.28 feet; September 21, 0.27 feet.

RUSH CREEK NEAR OCKENDEN, CAL.

Rush Creek is tributary to Big Creek, which enters Kings River in T. 12 S., R. 25 E.

This station, which is located at Peterson's sawmill, about 3 miles southeast of Ockenden, in the Sierra National Forest, was established September 22, 1910.

Taylor Creek enters 1 mile above the gage. No water is at present diverted for irrigation.

The gage is a vertical staff fastened to a large cedar tree, on the right bank, 200 feet above the wagon bridge. At high stages discharge measurements are made from the bridge; at low stages by wading above the gage.

Both banks are high and wooded and not subject to overflow. The channel is composed of sand and will shift at high stages.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Rush Creek near Ockenden, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 22	J. E. Stewart	4	0.8	0.40	0.5
Nov. 1	H. J. Tompkins	4	1.3	.45	1.2

NOTE.—These measurements were made by wading near the gage. The following measurements were made of discharge in Peterson's mill flume, which diverts water from Rush Creek above the gage: Sept. 22, 0.37 second-foot; Nov. 1, 0.18 second-foot.

Daily gage height, in feet, of Rush Creek near Ockenden, Cal., for 1910.

[Carl Peterson, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	0.45	0.51	11		0.98	21	0.53	0.53
2	.45	.51	12		.76	22	.53	.53
3	.45	1.55	13		.75	23	.53	.53
4		.75	14		.64	24	.52	.53
5		.52	15		.58	25	.82	.53
6		.51	16		.54	26	.96	.52
7		.49	17		.52	27	.65	.52
8		.48	18		.54	28	.58	.52
9		.47	19		.54	29	.54	.52
10		.47	20	0.54	.54	30	.51	.52
						31		.52

FRESNO RIVER BASIN.

GENERAL FEATURES.

Fresno River rises on the west slope of the Sierra Nevada, in the Sierra National Forest, near the headwaters of the South Fork of Merced River, flows in general southwestward, but its waters reach the San Joaquin only during the high-water season. At other times the excess water not used for irrigation sinks in the sand of the river channel near Madera.

The principal tributaries, all small except during the rainy season, are Lewis Fork, North Fork, China, Crooks and Coarse Gold creeks in the foothills, and Willow Creek, which joins the main river below Madera.

Near the head of the river (locally known as Redwood Creek), is a grove of big trees (*Sequoia gigantea*) known as the Nelder or Fresno grove.

Water is diverted from the headwater streams to feed the Madera Sugar Pine Lumber Co.'s flume, which is used to float lumber to Madera. Irrigation ditches take water at an altitude of about 4,500 feet, in the vicinity of Miami Mills, but only a small amount of water is used until the stream reaches the fertile valley land in the vicinity of Madera. A part of the flood waters could be stored by constructing a reservoir at Windy Gap near the mouth of Crooks Creek. The river below this point has considerable fall and power development is practicable.

FRESNO RIVER[1] NEAR FRESNO FLATS, CAL.

This station, which is located near the Salt Springs-Crane Valley highway bridge, in SE ¼ sec. 36, T. 6 S., R. 21 E., Mount Diablo base and meridian, 1½ miles above the junction with Lewis Fork, and about 4 miles northeast of Fresno Flats in the Sierra National Forest, was established September 23, 1910.

The station is below all important tributaries and above all diversions. Just above the bridge, water is diverted to a flume feeder of the Madera Sugar Pine Lumber Co.

The gage is a vertical staff fastened to an alder on the left bank about 400 feet above the bridge. Discharge measurements are made by wading.

There is but one channel at all stages as both banks are high. The bed of the stream is sandy and will shift at high stages.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

[1] Known locally as Redwood Creek.

Discharge measurements of Fresno River near Fresno Flats, Cal., in 1910.

Date.	Hydrograhper.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec. ft.*
Sept. 23	J. E. Stewart	14	7.8	0.51	4.6
Nov. 5	H. J. Tompkins	10	7.0	.49	2.5

NOTE.—Measurements made by wading near gage.

Gage height of Fresno River near Fresno Flats, Cal., for 1910.

[Wm. M. Brown, observer.]

	Feet.		Feet.
Nov. 1	0.5	Dec. 5	0.7
7	.5	12	.7
14	.6	20	.6
21	.6	28	.5
28	.6		

NORTH FORK OF FRESNO RIVER,[1] NEAR SUGAR PINE, CAL.

This station was established September 26, 1910, at the old mill at the Miami forest ranger's camp 3 miles southwest of Sugar Pine and 35 miles northwest of Raymond.

The gage is a vertical staff fastened to an alder on the left bank about 200 feet north of the ranger's station.

Discharge measurements are made by wading.

The stream bed, which is composed of sand and small bowlders, is smooth. Both banks are high and wooded and will not overflow.

No gage heights were observed during 1910 and no estimates of daily or monthly discharge have been prepared.

This station is maintained in cooperation with the United States Forest Service.

Discharge measurements of North Fork Fresno River near Sugar Pine, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 21	Stewart and Tompkins	9.5	11	0.50	3.7
Nov. 7	H. J. Tompkins	9.9	11	.59	3.5
Dec. 14	.....do	5	4.8	.55	4.7

NOTE.—All measurements were made by wading at various sections.

MERCED RIVER BASIN.

GENERAL FEATURES.

The drainage basin of Merced River lies on the western slope of the Sierra, north of the upper San Joaquin basin and south of the Tuolumne basin. It does not extend so far east as the other two basins, and it touches the Sierra divide in only one point—Mount

[1] Known locally as Miami Creek.

Lyell (elevation, 13,090 feet)—which is common to the three basins. The mountainous part of the basin lies almost wholly in Mariposa County; the foothill and valley parts are in Merced County. The basin is about 65 miles long from the rim of the valley to the crest and 20 to 25 miles wide, and its total area above the valley border is about 1,200 square miles.

Merced River has its source in numerous small glacial lakes in the region about Mount Lyell and flows southwestward to its junction with the lower San Joaquin, about 5 miles northeast of Newman. It has a total length of about 135 miles, two-thirds of which is in the mountains. Its chief tributaries are Tenaya and Yosemite creeks from the north and Illilouette and Bridal Veil creeks and South Fork from the south.

MERCED RIVER NEAR MERCED FALLS, CAL.

This station, which is located in the NW. ¼ sec. 11, T. 5 S., R. 15 E., M. D. B. and M., about 1½ miles east of Merced Falls, was established April 6, 1901.

No important tributaries enter for 25 miles above or below the station.

The water diverted for power development above the station returns to the river. Below Merced Falls, however, the combined capacity of irrigating canals in the vicinity of Snelling exceeds the low-water flow. All acquired water rights above Merced Falls are for power or mining development.

The staff gage, the datum of which has not been changed since the station was established, is in several sections on the right bank.

Discharge measurements are made from a cable near the gage.

The flow at the station is doubtless somewhat affected at times by artificial regulation at some of the power dams, several miles above, but pondage from the dam at Merced Falls probably has no appreciable effect at the station. The bed of the stream at the station is composed of gravel, and is subject to some changes at high water. The velocity is also very great at flood stages.

The 1909 rating table, which is well defined, has been used for 1910. The record is excellent.

Discharge measurements of Merced River near Merced Falls, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 4	J. E. Stewart	166	425	9.87	1,150
Apr. 2	.....do	202	575	10.69	2,100
May 16	.....do	289	983	12.56	5,340
June 30	.....do	146	326	9.25	658
July 16	W. V. Hardy	110	242	8.76	316
Aug. 25[a]	J. E. Stewart	59	72	8.30	149
26[a]	.....do	38	29	7.72	24

[a] Measurement made by wading, 200 yards above gage.

Daily gage height, in feet, of Merced River near Merced Falls, Cal., for 1910.

[C. Kelsey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	[a]15.6	10.1	9.8	10.6	11.65	11.8	9.15	8.5	8.0	8.2	8.3	8.5
2	12.25	9.95	9.95	10.65	11.55	11.6	9.1	8.5	7.9	8.2	8.3	8.5
3	11.3	9.9	10.05	10.65	11.7	11.1	9.1	8.45	7.95	8.2	8.35	8.5
4	10.7	9.8	10.2	10.8	11.3	10.85	9.0	8.4	7.95	8.15	8.3	8.55
5	10.4	9.8	10.25	11.0	10.95	10.7	8.9	8.4	7.95	8.0	8.1	8.7
6	10.25	9.7	10.25	11.0	11.1	10.6	8.8	8.35	8.1	8.0	8.25	8.65
7	10.15	9.75	10.35	10.9	11.8	10.4	8.8	8.35	7.7	8.15	8.2	8.6
8	10.0	9.85	10.35	11.2	12.25	10.3	8.8	8.35	7.9	7.95	8.45	8.65
9	9.95	9.7	10.45	11.6	12.3	10.2	8.9	8.3	7.95	7.95	8.35	8.7
10	9.9	9.7	10.45	11.75	12.3	10.2	8.95	8.4	7.7	7.95	8.2	8.75
11	9.8	9.65	10.45	11.65	12.2	10.25	8.9	8.35	7.7	8.0	8.45	8.85
12	9.75	9.65	10.5	11.25	12.05	10.3	8.9	8.3	7.95	8.05	8.45	9.4
13	9.65	9.65	10.55	11.0	12.3	10.15	8.9	8.2	7.95	8.7	8.45	9.05
14	9.95	9.7	10.55	11.45	12.25	10.05	8.8	8.3	7.95	8.7	8.45	8.9
15	10.6	9.7	10.45	11.75	12.4	9.95	8.8	8.3	7.95	8.6	8.45	8.8
16	12.25	9.6	10.25	12.0	12.45	9.75	8.8	8.25	10.15	8.6	8.45	8.7
17	11.45	9.55	10.2	12.3	12.0	9.75	8.8	8.25	9.65	8.6	8.45	8.7
18	10.75	9.55	10.45	12.5	11.85	9.75	8.8	8.25	9.05	8.6	8.4	8.6
19	10.45	9.8	11.05	12.6	11.7	9.65	9.2	8.25	8.85	8.65	8.45	8.65
20	10.2	9.85	11.15	12.7	11.95	9.55	9.25	8.3	8.6	8.6	8.5	8.65
21	10.1	9.7	10.85	12.4	11.9	9.5	9.1	8.2	8.5	8.6	8.45	8.6
22	10.15	9.65	11.2	12.6	12.05	9.4	8.85	8.05	8.4	8.6	8.5	8.6
23	10.35	9.7	12.2	12.7	12.0	9.35	8.8	8.05	8.35	8.5	8.45	8.5
24	10.75	9.65	11.4	12.8	12.15	9.3	8.8	8.05	8.3	8.5	8.5	8.55
25	10.85	9.7	10.95	12.7	11.95	9.3	8.75	8.05	8.25	8.4	8.65	8.55
26	10.6	9.7	10.85	12.9	11.75	9.3	8.65	8.05	8.25	8.4	8.6	8.55
27	10.5	9.65	10.55	12.65	11.85	9.4	8.6	8.05	8.3	8.35	8.55	8.55
28	10.4	9.7	10.45	12.5	11.85	9.4	8.6	8.05	8.25	8.3	8.5	8.5
29	10.3	.....	10.4	12.2	11.8	9.3	8.65	8.1	8.25	8.35	8.5	8.45
30	10.2	.....	10.4	11.85	11.9	9.2	8.6	8.05	8.25	8.3	8.5	8.45
31	10.1	.....	10.45	.....	11.85	.....	8.55	7.95	.....	8.3	.....	8.5

[a] Maximum 16.7 feet.

Daily discharge, in second-feet, of Merced River near Merced Falls, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14,600	1,320	1,040	1,930	3,590	3,860	555	220	70	115	145	220
2	4,710	1,170	1,170	2,000	3,420	3,500	525	220	51	115	145	220
3	2,990	1,120	1,270	2,000	3,680	2,670	525	200	60	115	162	220
4	2,070	1,040	1,430	2,210	2,990	2,280	465	180	60	102	145	240
5	1,670	1,040	1,490	2,510	2,440	2,070	410	180	60	70	90	305
6	1,490	945	1,490	2,510	2,670	1,930	355	162	90	70	130	282
7	1,380	990	1,610	2,360	3,680	1,670	355	162	23	102	115	260
8	1,220	1,080	1,610	2,830	4,710	1,550	355	162	51	60	200	282
9	1,170	945	1,740	3,500	4,810	1,430	410	145	60	60	162	305
10	1,120	945	1,740	3,770	4,810	1,430	438	180	23	60	115	330
11	1,040	905	1,740	3,590	4,610	1,490	410	162	23	70	200	382
12	990	905	1,800	2,910	4,320	1,550	410	145	60	80	200	720
13	905	905	1,860	2,510	4,810	1,380	410	115	60	305	200	495
14	1,170	945	1,860	3,240	4,710	1,270	355	145	60	305	200	410
15	1,930	945	1,740	3,770	5,020	1,170	355	145	60	260	200	355
16	4,710	865	1,490	4,220	5,130	990	355	130	1,380	260	200	305
17	3,240	828	1,430	4,810	4,220	990	355	130	905	260	200	305
18	2,140	828	1,740	5,240	3,950	990	355	130	495	260	180	260
19	1,740	1,040	2,590	5,470	3,680	905	585	130	382	282	200	282
20	1,430	1,080	2,750	5,700	4,130	828	618	145	260	260	220	282
21	1,320	945	2,280	5,020	4,040	790	525	115	220	260	200	260
22	1,380	905	2,830	5,470	4,320	720	384	80	180	260	220	260
23	1,610	945	4,610	5,700	4,220	685	355	80	162	220	200	220
24	2,140	905	3,160	5,940	4,510	650	355	80	145	220	220	240
25	2,280	945	2,440	5,700	4,130	650	330	80	130	180	282	240
26	1,930	945	2,280	5,940	3,770	650	282	80	130	180	260	240
27	1,800	905	1,860	5,580	3,950	720	260	80	145	162	240	240
28	1,670	945	1,740	5,240	3,950	720	260	80	130	145	220	220
29	1,550	.....	1,670	4,610	3,860	650	282	90	130	162	220	200
30	1,430	.....	1,670	3,950	4,040	585	260	80	130	145	220	200
31	1,320	.....	1,740	.....	3,950	.....	240	60	.....	145	.....	220

NOTE.—Daily discharge determined from a rating curve well defined below a discharge of 2,500 second-feet and fairly well defined above.

Monthly discharge of Merced River near Merced Falls, Cal., for 1910.

[Drainage area, 1,090 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	14,600	905	2,260	2.07	2.39	139,000	B.
February	1,320	828	974	.894	.93	54,100	A.
March	4,610	1,040	1,930	1.77	2.04	119,000	A.
April	5,940	1,930	4,010	3.68	4.11	239,000	A.
May	5,130	2,440	4,070	3.73	4.30	250,000	A.
June	3,860	585	1,360	1.25	1.40	80,900	A.
July	618	240	391	.359	.41	24,000	A.
August	220	60	132	.121	.14	8,120	A.
September	1,380	23	191	.175	.20	11,400	A.
October	305	60	171	.157	.18	10,500	A.
November	282	90	190	.174	.19	11,300	A.
December	720	200	290	.266	.31	17,800	A.
The year	14,600	23	1,330	1.22	16.60	965,000	

SOUTH FORK OF MERCED RIVER AT WAWONA, CAL.

This station was established December 15, 1910, at the upper foot bridge, opposite the United States military camp 1 mile below Wawona, in the SE. ¼ sec. 33, T. 4 S., R. 21 E., M. D. B. and M., in the Sierra National Forest.

Big Creek enters one-fourth mile above and Rush Creek three-fourths mile below the station. The ranch of the Wawona Co. at Wawona is irrigated from a tributary of the South Fork.

The gage is a vertical staff fastened to the center pier of the foot-bridge. At low and medium stages discharge measurements are made by wading below the bridge; a car and cable will be installed for high-stage measurements.

The channel, which is composed of gravel and small boulders, is straight for some distance above and below the station. The left bank is high; the right bank is more sloping. There is but one channel at all stages.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of South Fork of Merced River at Wawona, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
Sept. 24	J. E. Stewart	9.8	7.4	(a)	26
Dec. 15	H. J. Tompkins	35	39	2.00	38

[a] No gage installed.

NOTE.—Measurements made by wading.

Daily gage height, in feet, of South Fork of Merced River at Wawona, Cal., for 1910.

[A. C. Leonard, observer.]

	Feet.		Feet.
Dec. 15	2.0	Dec. 24	2.0
16	2.0	25	...
17	2.1	26	...
18	1.7	27	1.8
19	1.7	28	1.6
20	2.1	29	1.6
21	2.1	30	1.6
22	2.1	31	1.6
23	1.9		

BIG CREEK NEAR WAWONA, CAL.

This station, which is located at the highway bridge on the old Madera-Yosemite toll road at Summerdale (an abandoned post office), in sec. 23, T. 5 S., R. 21 E., 4 miles south of Wawona, was established September 25, 1910.

Several miles above the station water is diverted from Rush Creek, the principal tributary of Big Creek, for use in the flume of the Madera Sugar Pine Co. for floating lumber from Sugar Pine to Madera.

The gage is a vertical staff fastened to the downstream end of the left abutment of the bridge.

At high stages discharge measurements are made from the bridge.

No gage heights were observed during 1910 and no estimates of daily or monthly discharge have been prepared.

This station is maintained in cooperation with the United States Forest Service.

Discharge measurements of Big Creek near Wawona, Cal., in 1910.

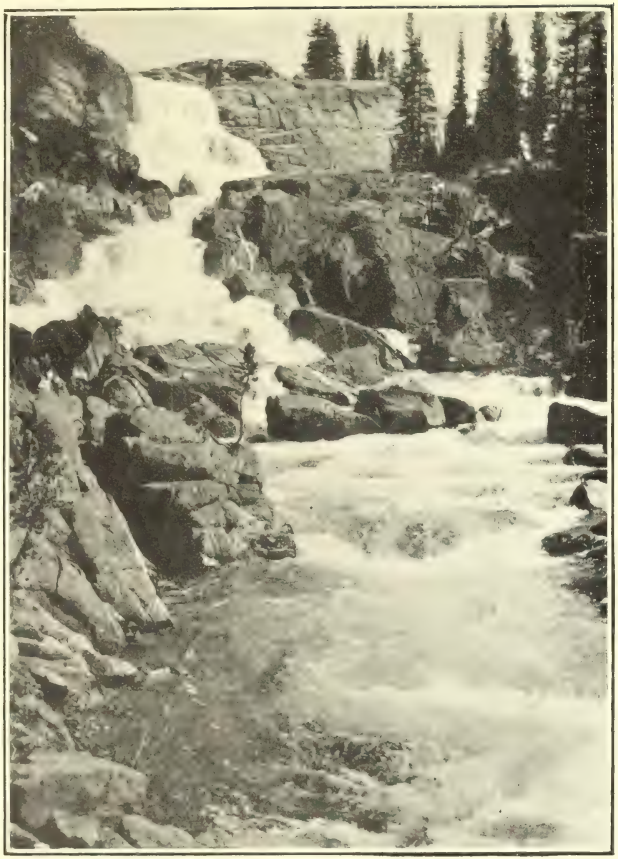
Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 25	Stewart and Roberts	10.5	4.8	0.17	3.9
Nov. 7	H. J. Tompkins	10.0	5.0	.20	4.5

NOTE.—Measurements made by wading.

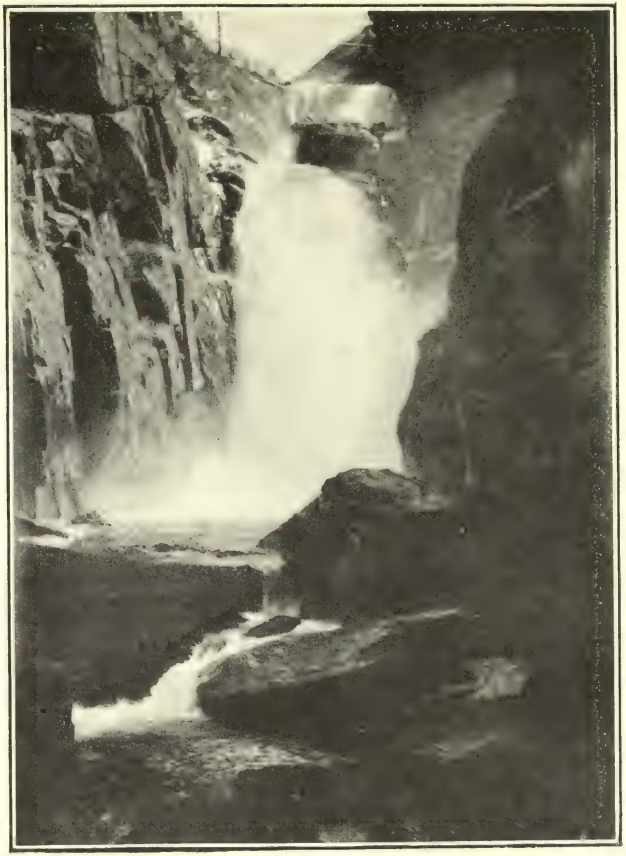
TUOLUMNE RIVER BASIN.

GENERAL FEATURES.

Tuolumne River drains an area on the western slope of the Sierra, north of the Merced basin and south of the Stanislaus basin. For a distance of about 50 miles the Sierra divide separates this basin from Mono Lake and Walker River basins to the east. The length of the basin is about 105 miles, two-thirds of which is in the mountains. The total area of the mountainous part of the drainage basin is about 1,680 square miles—almost wholly in Tuolumne County.



A. TUOLUMNE RIVER NEAR MOUTH OF CONNESS CREEK.



B. FALLS OF RANCHERIA CREEK, HETCH HETCHY VALLEY.

The Tuolumne rises in numerous glacial lakes on or near the Sierra divide, and flows southwestward to its junction with the San Joaquin, 10 miles west of Modesto. Its principal headwaters come from the glacier and lakes on the northern slope of Mount Lyell to the north and east of the headwaters of Merced River. The course of the river is through beautiful upland meadows in its upper part, then through a canyon nearly 80 miles long, which has been cut out of solid granite. The upper part of this canyon, for a distance of about 25 miles, is from 3,000 to 4,000 feet deep, and is known as the Grand Canyon of the Tuolumne. At the lower end of the Grand Canyon is Hetch Hetchy Valley, which is smaller than Yosemite Valley, but in every other way resembles it very much. (See Pl. III.) Finally, the river passes through the lower canyon into the San Joaquin Valley, which it enters near Lagrange. Its total length is about 150 miles.

Nearly all the tributaries of Tuolumne River enter from the north. In order from east to west, the principal ones are Return, Rancheria, Falls, and Cherry creeks, Clavey River, North Fork of Tuolumne River, and Woods Creek. Eleanor Creek is tributary to Cherry Creek. South Fork of Tuolumne River is tributary to the main stream from the south. Middle Fork is tributary to South Fork.

TUOLUMNE RIVER NEAR LAGRANGE, CAL.

This station was established August 29, 1895, at the wagon bridge at Lagrange, about 2 miles below the Lagrange dam and headworks of Turlock and Modesto canals, and half a mile below the power house of the Lagrange Water & Power Co. in NW. ¼ sec. 20, T. 3 S., R. 14 E., M. D. M. Since April 1, 1908, the station has been maintained at the dam in SE. ¼ sec. 17 T. 3 S., R. 14 E., M. D. M., and flow has been determined by considering the dam as a weir.

Woods Creek unites with the main stream from the north about 20 miles above Lagrange. No other tributaries of importance enter near the station.

Three important diversion systems take water from Tuolumne River above Lagrange: The Turlock and Modesto canals take water at Lagrange dam from the left and right banks, respectively, for irrigation in the San Joaquin Valley. The Lagrange Water & Power Co.'s canal takes water from the left bank about 17 miles above Lagrange. The diverted water is used chiefly for power development and all water so used is returned to the river below the dam. Water rights already acquired on this stream are considerably in excess of the low-water flow. It is practically impossible to determine the minimum flow of the stream very closely because of the diversions. During the late summer and fall the power and irrigation canals take the total flow and no water passes over the dam for several months at a time. Regular stations are maintained on

the three canals, but the minimum flow is appreciably affected by water that seeps around and through the dam and from the canals.

The gage is painted on a rock ledge on the right bank, 80 feet above the dam. The zero of the gage is at the average elevation of the crest of the dam. The gage at the original station is a vertical staff on the pier of the bridge from which occasional discharge measurements are made for checking the rating of the dam. The original datum of this gage is still maintained.

In general, conditions for obtaining accurate discharge data at Lagrange dam are very good, and, except for minimum flow, full reliance can be placed on the records at this station.

Discharge measurements of Tuolumne River at Lagrange, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec. ft.*
Apr. 1	J. E. Stewart	260	1,180	4.48	3,450
May 19	do	314	1,630	5.88	6,400
June 28	do	188	657	2.29	335

NOTE.—All measurements made at highway bridge at Lagrange.

Discharge measurements of Tuolumne River at Lagrange dam, near Lagrange, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec. ft.*
Apr. 1	J. E. Stewart			2.40	3,380
May 19	do			3.65	6,320
June 28	do			.51	300

NOTE.—To obtain the discharge over Lagrange dam as given in this table, from the discharge of the river at the highway bridge at Lagrange have been subtracted the flow of Lagrange Water & Power Co.'s canal and return waters entering the river between the bridge and the dam. These have been allowed for as follows:

		Sec. ft.
Apr. 1.	Lagrange Water & Power Co.'s canal	40
	Waste water from Modesto and Turlock canals	25
May 19.	Lagrange Water & Power Co.'s canal	26
	Waste water from Turlock canal	53
	Water in creek under Morgan flume	5
June 28.	Lagrange Water & Power Co.'s canal	30
	Waste water from Modesto and Turlock canals	4
	Water in creek under Morgan flume	1

Daily gage height, in feet, of Tuolumne River near Lagrange, Cal., for 1910.

[J. W. Simmons, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.0	2.0	1.7	2.55	2.65	4.55	0.05				0.3	0.5
2	3.4	1.7	1.9	2.55	2.3	4.3					.3	.6
3	2.6	1.8	2.0	2.5	2.8	3.6						.5
4	2.4	1.6	2.35	2.5	2.7	3.15					.3	
5		1.5	2.3	2.35	2.05	2.6						.85
6	2.9	1.5	2.75	2.7	2.15	2.7					.3	
7	1.9	1.5	2.25	2.6	2.9	2.45						
8	1.8	1.5	2.1	2.9	3.7	2.25				0.8		.95
9	1.7	1.4	2.3	3.1	4.35	2.2					.3	
10	1.7	1.15	2.2	3.4	4.4	2.25						

Daily gage height, in feet, of Tuolumne River near Lagrange, Cal., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	1.6	1.2	2.2	3.35	4.45	2.4						1.4
12		1.4	2.2	2.8	3.9	2.45					0.3	1.4
13	1.45	1.5	2.25	2.75	4.3	2.15				0.6		
14	1.9	1.5	2.3	2.95	4.3	2.05				.45		1.0
15	1.8	1.4	2.0	3.1	4.3	1.85				.35		.75
16	2.8	1.15	1.8	3.45	4.35	1.65			1.30	.25		
17	2.3	1.05	1.7	3.8	3.7	1.7			.8			
18	2.0	1.0	2.3	4.1	3.65	1.65			.25	.6		.6
19	1.8	1.3	3.8	4.3	3.7	1.5						.6
20	1.6	1.35	2.6	4.5	3.8	1.4				.5	.55	.6
21	1.6	1.1	2.55	3.95	3.8	1.3				.5	.55	
22	1.7	1.25	2.55	4.05	4.3	1.15						
23	2.2	1.2	2.1	4.2	4.5	1.0						
24	3.0	1.15	2.05	4.45	4.5	.8				.4	.7	
25	2.0	1.1	2.0	4.5	4.3	.6						.5
26	2.4	1.3	2.0	4.7	4.0	.7				.35		
27	2.4	1.25	2.05	4.7	4.15	.7					.65	.4
28	2.1	1.6	2.15	4.95	4.2	.65				.3		
29	2.0		2.35	3.95	4.2	.45						
30	2.0		2.6	3.15	4.35	.2				.3		
31	1.9		2.35		4.6							

Daily discharge, in second-feet, of Tuolumne River near Lagrange, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	13,300	2,560	2,000	3,690	3,910	8,780					149	320
2	5,670	2,000	2,370	3,690	3,160	8,080					149	421
3	3,800	2,180	2,560	3,580	4,240	6,180					149	320
4	3,370	1,830	3,260	3,580	4,020	5,060					149	515
5	3,920	1,660	3,160	3,260	2,660	3,800					149	710
6	4,470	1,660	4,130	4,020	2,850	4,020					149	753
7	2,370	1,660	3,060	3,800	4,470	3,480					149	795
8	2,180	1,660	2,750	4,470	6,440	3,060				648	149	838
9	2,000	1,500	3,160	4,940	8,220	2,950					149	1,060
10	2,000	1,110	2,950	5,670	8,360	3,060					149	1,280
11	1,830	1,180	2,950	5,540	8,500	3,370					149	1,500
12	1,700	1,500	2,950	4,240	6,970	3,480					149	1,500
13	1,580	1,660	3,060	4,130	8,080	2,850				421	177	1,200
14	2,370	1,660	3,160	4,580	8,080	2,660				274	205	905
15	2,180	1,500	2,560	4,940	8,080	2,280				189	233	589
16	4,240	1,110	2,180	5,800	8,220	1,920			1,340	115	261	533
17	3,160	972	2,000	6,730	6,440	2,000			648	268	289	477
18	2,560	905	3,160	7,520	6,310	1,920			115	421	316	421
19	2,180	1,340	6,700	8,080	6,440	1,660				370	343	421
20	1,830	1,420	3,800	8,640	6,700	1,500				320	370	421
21	1,830	1,040	3,690	7,100	6,700	1,340				320	370	400
22	2,000	1,260	3,690	7,380	8,080	1,110				290	423	380
23	2,950	1,180	2,750	7,800	8,640	905				259	477	360
24	4,700	1,110	2,660	8,500	8,640	648				229	530	340
25	2,560	1,040	2,560	8,640	8,080	421				209	512	320
26	3,370	1,340	2,560	9,220	7,240	530				189	494	274
27	3,370	1,260	2,660	9,220	7,660	530				169	476	229
28	2,750	1,830	2,850	9,960	7,800	476				149	437	229
29	2,560		3,260	7,100	7,800	274				149	398	229
30	2,560		3,800	5,060	8,220	81				149	359	229
31	2,370		3,260		8,930					149		229

NOTE.—The flow was all in the canals July 1 to Sept. 15, Sept. 19 to Oct. 7, and Oct. 9 to 12. Daily discharge interpolated for days of missing gage heights during January and after Oct. 12. Other determinations of discharge made from a fairly well-developed rating curve. The upper part of the curve has been defined by the weir formula, $Q = 905\ h^{\frac{3}{2}}$.

Monthly discharge of Tuolumne River near Lagrange, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	13,300	1,580	3,150	194,000	A.
February	2,560	905	1,470	81,600	A.
March	6,700	2,000	3,090	190,000	A.
April	9,960	3,260	6,030	359,000	A.
May	8,930	2,660	6,770	416,000	A.
June	8,780	81	2,610	155,000	A.
July	0	0	0	0	
August	0	0	0	0	
September	1,340	0	70.1	4,170	B.
October	648	0	171	10,500	B.
November	530	149	282	16,800	B.
December	1,500	229	587	36,100	B.
The year	13,300	0	2,020	1,460,000	

NOTE.—Flow over the dam only.

MODESTO CANAL NEAR LAGRANGE, CAL.

The Modesto canal, which diverts water from the right bank of Tuolumne River, is owned by the Modesto irrigation district. The water is taken through a concrete bulkhead at the end of Lagrange dam and is used for irrigating 81,200 acres of land around Modesto in Stanislaus County. The district has filed on 640 second-feet, but the maximum capacity of the canal at present is less than 600 second-feet.

The principal part of the construction work on this canal was done prior to 1892, but on account of litigation the canal was not finished until April, 1903. A gage-height record has been kept since April 26, 1903, when a gage was installed in Indian Hill flume, near Lagrange, Cal. On July 12, 1904, the station was moved to the flume near the intake, in SE. $\frac{1}{4}$ sec. 17, T. 3 S., R. 14 E., M. D. M., in order that more gage readings could be made and their fluctuations better interpreted. The gage is an iron staff in a concrete well about 50 feet below the waste gates. Measurements are made from a footbridge at a concrete section about 500 feet below the headworks.

This station is well rated and the record is excellent.

Discharge measurements of Modesto canal near Lagrange, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 18	J. E. Stewart	22.1	89.3	3.38	570
18	do	21.9	84.7	3.22	538
18	do	21.7	69	2.60	414
18	do	21.3	54.1	2.00	298
18	do	20.9	40	1.50	192
18	do	20.7	26.3	.99	100

Daily gage height, in feet, of Modesto canal near Lagrange, Cal., for 1910.

[J. W. Simmons, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	2.75	.....	3.12	3.22	3.35	1.0	0.35	.....
2	.....	2.7	.....	3.11	3.2	3.15	1.0	.35	.....
3	1.0	1.9	.....	5.25	3.22	2.9	1.0	.....	.....
4	1.45	.....	.....	3.18	3.22	2.55	.9	.2	.....
5	1.75	2.15	1.0	3.18	3.24	2.45	.8	.25	.....
6	1.75	.7	1.25	3.2	3.24	1.8	.7	.1	.....
7	1.75	.....	1.6	3.19	3.22	1.85	.7	.2	.....
8	2.0	2.3	2.0	3.2	3.21	1.9	.65	.35	0.8
9	2.0	1.3	2.6	3.11	3.22	1.95	.65	.....	.8
10	2.0	2.75	2.6	3.2	3.2	2.0	.3	.....	.65
11	1.85	2.75	2.6	3.2	3.23	1.95	.....	.....	.8
12	.....	2.75	2.55	3.2	3.22	1.95	.5	.....	.9
13	.....	2.75	2.6	3.2	3.21	1.8	.5	.1	1.4
14	.....	2.75	2.6	3.2	3.23	1.7	.5	.1	1.5
15	2.0	2.75	2.62	3.2	3.24	1.6	.45	.15	1.6
16	2.3	2.75	2.66	3.2	3.3	1.55	.45	.75	1.6
17	2.45	2.75	2.7	3.2	3.3	1.45	.4	.75	.....
18	2.6	2.9	2.75	3.28	3.31	1.4	.4	1.05	.....
19	2.65	2.9	2.95	3.22	3.3	2.15	.4	1.5	.....
20	2.65	.....	2.98	3.2	3.32	2.2	.4	1.2	.....
21	2.7	3.2	3.02	3.2	3.31	2.3	.4	.9	.....
22	2.65	3.2	2.98	3.18	3.31	1.8	.6	.75	.....
23	2.6	.....	3.10	3.22	3.31	1.6	.5	.7	.....
24	2.6	2.9	3.05	3.22	3.3	1.45	.45	.65	.....
25	2.6	2.5	3.15	3.2	3.31	1.35	.4	.5	.....
26	2.7	2.2	2.98	3.21	3.31	1.25	.45	.45	.....
27	2.7	1.5	3.00	3.23	3.31	1.2	.45	.45	.....
28	1.35	.....	3.05	3.21	3.3	1.2	.45	.45	.....
29	.....	.....	3.15	3.22	3.31	1.15	.45	.....	.....
30	.....	.....	3.12	3.2	3.34	1.1	.45	.....	.....
31	.....	.....	.....	3.22	.....	1.05	.45	.....	.....

Daily discharge, in second-feet, of Modesto canal near Lagrange, Cal., for 1910.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	0	444	0	518	538	564	100	18	0
2	0	434	0	516	534	524	100	18	0
3	100	274	0	544	538	474	100	0	0
4	184	0	6	530	538	404	84	7	0
5	244	324	100	530	542	384	69	10	0
6	244	55	146	534	542	254	55	2	0
7	244	0	214	532	538	264	55	7	0
8	294	354	294	534	536	274	49	18	69
9	294	155	414	516	538	284	49	14	69
10	294	444	414	534	534	294	14	11	49
11	264	444	414	534	540	284	0	8	69
12	0	444	404	534	538	284	32	5	84
13	0	444	414	534	536	254	32	2	174
14	0	444	414	534	540	234	32	2	194
15	294	444	418	534	542	214	27	4.5	214
16	354	444	426	534	554	204	27	62	214
17	384	444	434	534	554	184	22	62	0
18	414	474	444	550	556	170	22	108	0
19	424	474	484	538	554	324	22	194	0
20	424	544	490	534	558	334	22	136	0
21	434	534	498	534	556	354	22	84	0
22	424	534	490	530	556	254	43	62	0
23	414	584	514	538	556	214	32	55	0
24	414	474	504	538	554	184	27	49	0
25	414	394	524	534	556	164	22	32	0
26	434	334	490	536	556	146	27	27	0
27	434	194	494	540	556	136	27	27	0
28	164	0	504	536	554	136	27	27	0
29	.....	0	524	538	556	126	27	0	0
30	.....	0	518	534	562	117	27	0	0
31	.....	0	.....	538	.....	108	27	.....	0

NOTE.—No flow in the canal during 1910 on days for which no gage height is given, except Mar. 20 and 23, when gage heights were observed incorrectly, and Sept. 9 to 12. Daily discharge for those days estimated. Other determinations of daily discharges obtained from a rating curve well defined above 10 second-feet.

Monthly discharge of Modesto Canal near Lagrange, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	0	0	0	0	
February	434	0	271	15,100	A.
March	[a] 584	0	327	20,100	A.
April	524	0	366	21,800	A.
May	550	516	534	32,800	A.
June	562	534	547	32,500	A.
July	564	108	263	16,200	A.
August	100	0	39.4	2,420	A.
September	194	0	35.0	2,080	B.
October	214	0	36.6	2,250	C.
November	0	0	.0	0	
December	0	0	.0	0	
The year	584	0	201	145,000	

[a] Estimated.

TURLOCK CANAL NEAR LAGRANGE, CAL.

The Turlock canal, which is owned by the Turlock irrigation district, diverts water through a short tunnel from the left bank of Tuolumne River. The head gates are only a few feet above Lagrange dam. The diverted water is used for irrigating 176,000 acres of fertile land in the vicinity of Turlock and Ceres in Stanislaus County. The district has filed on 1,500 second-feet, but the maximum capacity of the canal at present is somewhat less than 1,000 second-feet.

The first water was turned into the canal in small quantities in 1898 and was used for puddling. A record of the gage height has been kept from July, 1899, to the present time. The gage is a staff float in a concrete well a few feet below the waste gates. The gage is located at the head of the canal of the Turlock irrigation district, in the SW. $\frac{1}{4}$ sec. 16, T. 3 S., R. 14 E., M. D. B. and M. Measurements are made in a board flume about half a mile below the gage well.

The 1910 rating curve is well defined and the record is excellent.

Discharge measurements of Turlock canal near Lagrange, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 1	J. E. Stewart	23.8	112	4.00	535
June 28	do	23.8	155	5.48	811
28	do	23.8	160	5.62	862
June 29	do	23.8	77.6	2.48	271
29	do	23.8	108	3.65	473
29	do	23.8	130	4.54	631

Daily gage height, in feet, of Turlock canal near Lagrange, Cal., for 1910.

[H. T. Sackett, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	2.4	4.0	5.5	.....	5.45	2.25	0.35	1.05
2	.....	2.4	4.0	5.5	.....	5.3	2.1	.35	.....
3	.....	2.45	4.0	5.5	.....	5.15	2.0	.3	.....
4	.....	3.05	4.0	.3	.....	4.95	1.85	.15	.....
5	.....	3.05	4.0	3.8	.....	4.6	1.8	.2	.....
6	.....	3.5	4.0	5.45	.....	4.25	1.65	.2	.....
7	.....	3.5	4.0	5.55	.....	4.1	1.55	.2	.....
8	.....	3.5	4.0	5.6	.....	4.1	1.45	.2	.....
9	1.4	3.5	4.05	5.6	.....	4.45	1.35	.2	.....
10	1.45	3.5	4.0	.....	.....	4.4	1.35	.2	.....
11	1.7	3.45	4.0	.....	.....	4.4	1.35	.2	.....
12	1.75	3.5	3.95	.....	.....	4.35	1.15	.2	.....
13	1.75	3.5	4.0	.....	.....	4.05	1.1	.2	.....
14	1.8	3.5	4.05	.....	.....	3.75	1.05	.15	.....
15	1.95	4.0	4.0	.....	.....	3.55	1.0	.15	.....
16	2.25	4.0	4.0	.....	.....	3.45	.95	2.5	.....
17	2.4	4.0	4.05	.....	.....	3.3	.9	4.0	.....
18	2.4	4.05	4.05	.....	.....	3.15	.75	4.0	.....
19	2.4	4.05	4.0	.....	.....	4.8	.7	3.95	.....
20	2.4	4.0	4.5	.....	.....	4.85	.7	2.6	.....
21	2.4	3.85	4.5	.....	.....	5.4	.7	2.2	.....
22	2.4	3.0	4.5	.....	1.0	4.3	.5	1.85	.....
23	2.4	4.0	4.5	.....	2.0	3.75	.5	1.6	.....
24	2.4	4.0	5.0	.....	3.0	3.4	.5	1.35	.....
25	2.4	3.95	5.0	.....	4.7	3.1	.5	1.15	.....
26	2.4	4.0	5.05	.....	5.05	2.8	.5	1.05	.....
27	2.4	4.0	5.0	.....	5.3	2.7	.5	1.0	.....
28	2.4	4.0	5.05	.....	5.5	2.6	.55	.8	.....
29	.....	2.8	4.0	.....	5.6	2.6	.45	1.2	.....
30	.....	4.0	5.0	.....	5.5	2.6	.45	1.35	.....
31	.....	4.0	.....	.....	.....	2.45	.45	.....	.....

Daily discharge, in second-feet, of Turlock canal near Lagrange, Cal., for 1910.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	0	260	533	827	0	817	238	26	90
2	0	260	533	827	0	787	216	26	0
3	0	268	533	827	0	757	202	22	0
4	0	364	533	22	0	717	183	10	0
5	0	364	533	496	0	647	177	14	0
6	0	442	533	817	0	580	159	14	0
7	0	442	533	837	0	552	147	14	0
8	0	442	533	847	0	552	135	14	0
9	129	442	542	847	0	618	123	14	0
10	135	442	533	0	0	609	123	14	0
11	165	433	533	0	0	609	123	14	0
12	171	442	524	0	0	600	100	14	0
13	171	442	533	0	0	542	95	14	0
14	177	442	542	0	0	487	90	10	0
15	196	533	533	0	0	451	85	10	0
16	238	533	533	0	0	433	80	275	0
17	260	533	542	0	0	407	75	533	0
18	260	542	542	0	0	382	62	533	0
19	260	542	533	0	0	687	57	524	0
20	260	533	628	0	0	697	57	290	0
21	260	505	628	0	0	807	57	230	0
22	260	356	628	0	85	590	39	183	0
23	260	533	628	0	202	487	39	153	0
24	260	533	727	0	356	424	39	123	0
25	260	524	727	0	667	373	39	100	0
26	260	533	737	0	737	322	39	90	0
27	260	533	727	0	787	306	39	85	0
28	260	533	737	0	827	290	44	66	0
29	.....	322	707	0	847	290	34	106	0
30	.....	533	727	0	827	290	34	123	0
31	.....	533	.....	0	.....	268	34	.....	0

NOTE.—No flow in the canal Jan. 1 to Feb. 8, May 10 to June 21, and Oct. 2 to Dec. 31. Water turned out because of leak in canal May 10 to June 21. Daily discharge determined from a rating curve well defined between 250 and 850 second-feet.

Monthly discharge of Turlock canal near Lagrange, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	0	0	0	0	
February	260	0	161	8,940	A.
March	542	260	456	28,000	A.
April	737	524	592	35,200	A.
May	847	0	205	12,600	B.
June	847	0	178	10,600	B.
July	817	268	528	32,500	A.
August	238	34	95.6	5,880	B.
September	533	10	121	7,200	B.
October	90	0	2.9	178	
November	0	0	.0	0	
December	0	0	.0	0	
The year	847	0	195	141,000	

Monthly discharge of Tuolumne River, Turlock canal, and Modesto canal, near Lagrange, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	13,300	1,580	3,150	194,000
February	2,560	1,580	1,900	106,000
March	7,720	2,700	3,870	238,000
April	11,200	3,890	6,990	416,000
May	9,470	3,690	7,510	462,000
June	9,320	1,470	3,340	199,000
July	1,380	376	791	48,600
August	338	61	135	8,300
September	1,680	12	226	13,400
October	717	0	210	12,900
November	530	149	282	16,800
December	1,500	229	587	36,100
The year	13,300	0	2,420	1,750,000

NOTE.—These estimates represent the combined flow of Tuolumne River at Lagrange Dam, Turlock Canal, and Modesto Canal, but do not include the flow in the power canal.

LAGRANGE WATER & POWER CO.'S CANAL NEAR LAGRANGE, CAL.

The Lagrange Water & Power Co.'s canal takes water from the south side of Tuolumne River at Indian Bar, about 17 miles above the town of Lagrange. This canal was built in the early days to supply water for hydraulic mining in the vicinity of Lagrange, and it is now locally known as the "old mining ditch." Recently it has been thoroughly repaired and is now used as a supply canal for the new hydro-electric plant which was installed in the latter part of 1907. The power house is situated on the bank of the river about half a mile above the town of Lagrange and is below the dam and headworks of the Turlock and Modesto irrigation canals. Gage heights are depths of water in the flume.

No discharge measurements were made in 1910.

Daily gage height, in feet, and discharge, in second-feet, of Lagrange Water & Power Co.'s canal near Lagrange, Cal., for 1910.

[H. T. Sackett, observer.]

Day.	April.		May.		June.		July.		August.		September.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharg.
1			2.60	61.0					2.65	62.8	2.60	61.0
2			2.60	61.0					2.65	62.8	2.60	61.0
3			2.60	61.0					2.60	61.0		.0
4			2.45	55.8					2.60	61.0	2.65	62.8
5			2.60	61.0					2.63	62.0	2.60	61.0
6			2.60	61.0					2.60	61.0	2.60	61.0
7			2.60	61.0					2.55	59.2	2.55	59.2
8			2.25	48.8					2.55	59.2	2.55	59.2
9			2.25	48.8					2.60	61.0	2.55	59.2
10									2.62	61.7	2.55	59.2
11									2.63	62.0	2.58	60.3
12	2.40	54.0					2.7	64.5	2.60	61.0		
13		.0						.0	2.60	61.0		
14	2.40	54.0					2.6	61.0	2.63	62.0		
15	2.40	54.0					2.6	61.0	2.62	61.7		
16	2.40	54.0					2.63	62.0	2.60	61.0		
17	2.35	52.2					2.62	61.7	2.63	62.0		
18		.0					2.55	59.2	2.63	62.0		
19	2.40	54.0					2.65	62.8	2.63	62.0		
20	2.40	54.0					2.62	61.7	2.62	61.7		
21	2.55	59.2					1.38	23.0	2.60	61.0		
22	2.55	59.2					1.32	21.5	2.60	61.0		
23	2.55	59.2					2.59	60.6	2.30	50.5		
24	2.55	59.2					2.55	59.2	2.63	62.0		
25	2.55	59.2					1.42	24.0	2.63	62.0		
26	2.50	57.5					1.40	23.5	2.65	62.8		
27	2.35	52.2					1.30	21.0	2.63	62.0		
28	2.35	52.2					1.30	21.0	2.65	62.8		
29	2.35	52.2					1.32	21.5	2.63	62.0		
30	2.5	57.5					1.38	23.0	2.60	61.0		
31							2.64	62.4	2.60	61.0		

NOTE.—No records May 10 to July 11. No flow in canal Apr. 13 and 18, July 13, and Sept. 3. It is believed that the canal was in use throughout the year and that the flow was fairly uniform. Daily discharge determined from a well-defined rating curve.

Monthly discharge of Lagrange Water & Power Co.'s canal near Lagrange, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April (12–30)	59.2	0	49.7	1,870	B.
May (1–9)	61	48.8	57.7	1,030	B.
July (12–31)	64.5	0	42.7	1,690	B.
August	62.8	59.2	61.2	3,760	B.
September (1–11)	62.8	0	54.9	1,200	B.

JAWBONE CREEK NEAR TUOLUMNE, CAL.

This station, which is located 1½ miles above the mouth of the stream, at the Jawbone ranger station in the Stanislaus National Forest, about 12 miles southeast of Tuolumne, in the NE. ¼ SE. ¼ sec. 33, T. 1 N., R. 18 E., M. D. B. and M., was established September 13, 1910.

No tributaries enter below the gage. A small ditch takes water above the station for irrigation at the ranger's camp.

The vertical staff gage is fastened to a cottonwood tree on the right bank about 100 feet below the trail crossing.

At high stages discharge measurements may be made from an old bridge about 1,000 feet below.

Both banks are high and wooded and not subject to overflow. The bed of the stream is composed of gravel and bowlders and the current is swift.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Jawbone Creek near Tuolumne, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 13	J. E. Stewart	10	8.7	0.20	2.9
Oct. 20	H. J. Tompkins	10	9.1	.25	4.1
Dec. 2	.....do	10	9.1	.30	4.6

NOTE.—All measurements were made by wading.

Daily gage height, in feet, of Jawbone Creek near Tuolumne, Cal., for 1910.

[J. B. Pestoni, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1				0.29	16		0.30	0.30	0.31
2			0.25	.30	17			.30	
3			.25	.65	18			.41	
4			.27	.52	19				
5			.28		20		.25		
6			.29		21				
7			.29	.35	22				
8			.28	.32	23				
9			.29	.32	24				
10				.49	25				
11				.70	26		.27		
12		0.40		.40	27				
13	0.20		.32	.35	28			.30	
14			.31	.32	29			.30	
15			.30	.32	30		.25	.29	
					31				

CORRAL CREEK NEAR GROVELAND, CAL.

This station, which is located at the Clavey trail crossing, 1 mile west of the forest ranger's station on Jawbone Creek, 2 miles above the mouth of Corral Creek and 15 miles northeast of Groveland, was established October 21, 1910.

The gage is a vertical staff fastened to an alder on the right bank of the trail crossing.

Discharge measurements are made by wading near the gage.

The channel, which is composed of bowlders and gravel, is rough. The left bank is low and may be overflowed.

The station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Corral Creek near Groveland, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 21	H. J. Tompkins	7.5	3.5	0.60	1.0
Dec. 2	do	4.0	2.3	.70	1.0

NOTE.—All measurements made by wading.

Gage height, in feet, of Corral Creek near Groveland, Cal., for 1910.

[J. B. Pestoni, observer.]

	Feet.
Nov. 4	0.62
6	.64
13	.68
Dec. 1	.70
11	.90

SOUTH FORK OF TUOLUMNE RIVER NEAR GROVELAND, CAL.

This station, which is located at the South Fork trail bridge, one-fourth mile above the mouth, and about 10 miles east of Groveland, was established September 13, 1910.

The Middle Fork of the Tuolumne enters about 2½ miles above the station. At the Hardin ranch, about 7 miles above the mouth, a ditch originally built for mining, diverts water for power. The water is not returned to the river.

The gage is a vertical staff on the middle pier of trail bridge.

At low and medium stages discharge measurements are made by wading near the gage. No equipment has been installed for making measurements at high stages.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of South Fork of Tuolumne River near Groveland, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 13	J. E. Stewart	11	13	0.27	5.1
Dec. 5	H. J. Tompkins	29.5	31	.98	28

NOTE.—Measurements made by wading.

Gage height, in feet, of South Fork of Tuolumne River near Groveland, Cal., for 1910.

[J. B. Pestoni, observer.]

	Feet.
Sept. 13	0.27
Oct. 25	.65
Dec. 5	.98
6	.90
12	1.40
13	1.25

CLAVEY RIVER NEAR TUOLUMNE, CAL.

This station, which is located near the Luke Meadow trail, 11 miles above the junction with Tuolumne River, and about 10 miles southeast of Tuolumne, in the NW. ¼ SW. ¼ sec. 24, T. 1 N., R. 17 E., M. D. B. and M., in the Stanislaus National Forest, was established September 12, 1910.

Reed Creek enters about one-half mile above and Indian Creek 300 feet below the station. Power is developed near the mouth of the river.

The gage is a vertical staff in two sections in the left bank of the river 150 feet below the trail bridge.

At low stages discharge measurements are made by wading. A car and cable for high-stage measurements have not yet been installed.

Both banks are high and wooded and not subject to overflow. The channel is composed of bowlders and bed rock and is rough. The current is swift at all stages.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Clavey River near Tuolumne, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 12	Stewart and Tompkins	16	21	0.40	14
Oct. 22	H. J. Tompkins	17	24	.78	25

NOTE.—Measurements made by wading.

Gage height of Clavey River near Tuolumne, Cal., for 1910.

[J. B. Pestoni, observer.]

	Feet.
Sept. 12	0.4
20	.3
Oct. 20	.9
Nov. 13	1.0
Dec. 1	1.05

INDIAN CREEK[1] NEAR TUOLUMNE, CAL.

This station, which is located at the Clavey River trail bridge, 300 feet above the mouth of the stream, and about 10 miles southeast of Tuolumne, in the Stanislaus National Forest, was established October 22, 1910.

Indian Creek joins Clavey River about half a mile below the mouth of Reed Creek and 1 mile above the mouth of Quilty Creek.

The gage is a vertical staff fastened to an alder on the right bank, just below the trail crossing.

Discharge measurements are made by wading.

The bed of the stream is rough and there is but one channel at all stages. The current is swift.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

The following discharge measurement was made by H. J. Tompkins by wading.

December 6, 1910: Width, 3.5 feet; area, 1.3 square feet; gage height, 1.02 feet; discharge, 1.0 second-feet.

Gage height of Indian Creek near Tuolumne, Cal., for 1910.

[O. E. Fowler, observer.]

	Feet.		Feet.
Oct. 31	0.91	Nov. 20	1.00
Nov. 1	.91	27	1.00
13	1.00	Dec. 1	1.00
19	1.00		

NORTH FORK OF TUOLUMNE RIVER NEAR TUOLUMNE, CAL.

This station, which is located at the Providence Mine bridge, about 2 miles southeast of Tuolumne, in the SE. ¼ sec. 9, T. 1 N., R. 16 E., M. D. B. and M., was established September 11, 1910.

Basin Slope Creek enters about 3 miles above and Hunter Creek 2 miles below the station.

The gage is a vertical staff fastened to the left abutment of the bridge.

Discharge measurements are made by wading whenever possible, as the section at the bridge is rough.

The banks of this stream are high and wooded and not subject to overflow. The bed of the stream is composed of bed rock, small bowlders and sand and is rough. The current is very swift at high stages.

[1] Known also as Bear Creek.

The station is maintained in cooperation with the United States Forest Srevice.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of North Fork of Tuolumne River near Tuolumne, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 11	Stewart and Tompkins	21	20	0.16	6.7
Oct. 23	H. J. Tompkins	14	15	.55	13
Dec. 7	do	34	31	.60	22

NOTE.—Measurements made by wading.

Gage height of North Fork of Tuolumne River near Tuolumne, Cal., for 1910.

[J. B. Pestoni, observer.]

	Feet.
Sept. 11	0.16
Oct. 20	.41
Dec. 1	.49

HUNTER CREEK NEAR TUOLUMNE, CAL.

This station, which is located at the Luke Meadow road crossing, about 6 miles southeast of Tuolumne, in the NW. ¼ NE. ¼ sec. 19, T. 1 N., R. 17 E., Mount Diablo base and meridian, in the Stanislaus National Forest, was established September 11, 1910.

Hunter Creek joins the North Fork of Tuolumne River about 5 miles below the station.

The gage is a vertical staff fastened to an alder on the left bank 50 feet above the ford.

Discharge measurements are made by wading near the ford.

Both banks are high and wooded and not subject to overflow. The bed of the stream is composed of coarse gravel and appears permanent.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Hunter Creek near Tuolumne, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 11	Stewart and Tompkins	3.7	1.2	0.20	0.5
Dec. 6	H. J. Tompkins	2.0	2.0	.40	2.2

NOTE.—Measurements were made by wading.

Daily gage height, in feet, of Hunter Creek near Tuolumne, Cal., for 1910.

[J. B. Pestoni, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1			0.40	0.42	16				
2					17				
3					18				
4		0.19			19				
5					20	0.45	0.31	0.45	
6					21				
7					22				
8					23		.32		
9		.18			24				
10					25				
11	0.20				26				
12	.21				27			.46	
13			.46		28				
14	.27				29		.33		
15					30				
					31		.40		

STANISLAUS RIVER BASIN.

GENERAL FEATURES.

Stanislaus River drains a long, narrow basin lying on the western slope of the Sierra, north of the Tuolumne basin, south of the Calaveras and Mokelumne basins, and west of the Walker River basin, from which it is separated for a distance of about 25 miles by the Sierra divide. The length of the basin from the valley rim to the crest of the divide is about 75 miles; its width averages about 12 miles in the foothills and less than 25 miles near the eastern border. North Fork above and the main stream below form the boundary between Calaveras and Tuolumne counties. The total drainage area above the valley is about 950 square miles.

Stanislaus River has its source in small glacial lakes and on high peaks of the Sierra divide, and flows southwestward to its junction with the lower San Joaquin about 15 miles west of Modesto. It has a total length of about 120 miles, of which about 80 miles is in the mountains and 40 miles in the valley. The main stream is formed by the confluence of its three principal forks heading well back in the mountains. Middle Fork, the largest and most important, unites with North Fork about 12 miles north of Sonora and 30 or 35 miles above the valley rim; South Fork joins the main stream about 8 miles below the junction of North and Middle forks.

STANISLAUS RIVER AT KNIGHTS FERRY, CAL.

A gaging station was established on Stanislaus River May 3, 1895, at the railroad bridge half a mile north of Oakdale. On July 30, 1898, a cable was placed about 1,000 feet below the railroad bridge, and the station was maintained at this point until February 16, 1901, when it was discontinued.

The present station, which is located in the NE. ¼ sec. 29, T. 1 S., R. 12 E., M. D. B. and M., at Knights Ferry, about 12 miles northeast of Oakdale, was established May 19, 1903.

No important tributaries enter below the station or for many miles above. South Fork joins the main stream about 25 miles above the station.

Numerous ditches divert water from Stanislaus River for mining operations, but most of the water is returned to the river. Some water, however, is diverted from the South Fork and turned into the Tuolumne basin. Water which is not returned to Stanislaus River is also diverted from North Fork for use in the vicinity of Murphy and Angels.

The Stanislaus Water Co. diverts water about 3 miles above Knights Ferry for power development and also for irrigating land between Knights Ferry and Stockton. The amount used for power is returned to the river through the power house about 1,000 feet above the gaging station. The developed and acquired water rights probably exceed the low-water flow of the stream.

The staff gage, the datum of which has not been changed since the station was established, is in several sections on the right bank.

Discharge measurements are made from a cable 25 feet above the gage.

The conditions for obtaining accurate discharge data at this station are not the best, on account of excessive velocities at high stages and changing conditions of control at low and moderate stages. About 800 feet above the station the stream is divided into two channels by an island, and a low dam spans each channel at the head of the island. On the right bank below one of these dams is a power house which operates with water taken from behind the dam, and also from the ditch heading about 3 miles above. The tail water returns to the river, and varies with the load at different hours of the day, thus affecting the gage height somewhat at low stages. The channel section at the station is also subject to slight change, and both banks overflow to some extent in high floods.

The 1910 rating curve is well defined and the record is good.

Discharge measurements of Stanislaus River at Knights Ferry, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 2	J. E. Stewart	154	424	7.72	1,560
Mar. 30	do	200	643	9.00	3,040
May 17	do	203	713	9.30	3,600
June 27	do	132	285	6.62	669
July 16	do	110	205	6.00	305
Aug. 27	do	91	154	5.54	151
Nov. 1	W. V. Hardy	75	141	5.58	131

Daily gage height, in feet, of Stanislaus River at Knights Ferry, Cal., for 1910.

[E. J. Coop, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.9	8.05	8.4	9.2	9.45	9.5	6.55	5.8	5.4	5.45	5.7	5.7
2	9.5	7.9	8.45	9.35	9.2	9.35	6.6	5.9	5.4	5.45	5.7	5.7
3	8.8	7.7	8.7	9.3	9.15	8.9	6.45	5.9	5.4	5.5	5.7	5.7
4	8.45	7.65	8.85	9.35	9.05	8.7	6.45	5.8	5.4	5.5	5.65	5.95
5	8.15	7.6	8.8	9.6	8.75	8.15	6.4	5.9	5.6	5.5	5.7	6.35
6	8.1	7.55	8.85	9.5	8.7	8.05	6.35	5.5	5.4	5.5	5.55	6.1
7	8.05	7.7	8.8	9.6	8.55	7.85	6.3	5.45	5.4	5.5	5.55	6.0
8	7.85	7.65	8.85	10.0	9.8	7.75	6.1	5.5	5.4	5.5	6.0	6.0
9	7.85	7.7	9.05	10.3	10.2	7.8	6.1	5.5	5.4	5.45	5.9	6.35
10	7.85	7.8	9.1	10.2	10.3	7.8	6.1	5.4	5.4	5.5	5.6	6.15
11	7.7	7.55	9.15	10.3	10.1	7.85	6.2	5.45	5.4	5.5	5.6	6.6
12	7.6	7.5	9.3	9.7	9.6	7.9	6.35	5.6	5.4	5.7	5.75	6.9
13	7.55	7.6	9.3	9.65	9.7	7.8	6.25	5.8	5.5	5.9	5.7	6.5
14	7.9	7.7	9.35	10.05	9.6	7.65	6.05	5.7	5.4	5.85	5.75	6.3
15	8.1	7.7	9.15	10.05	9.75	7.4	6.05	5.6	5.4	5.8	5.75	6.2
16	9.05	7.7	8.8	10.3	9.55	7.15	6.1	5.5	5.45	5.8	5.75	6.15
17	8.45	7.7	8.8	10.75	9.2	7.2	6.0	5.55	6.1	5.7	5.8	6.0
18	7.95	7.55	9.4	10.85	9.05	7.1	6.05	.....	6.05	5.7	5.7	5.95
19	7.8	7.7	11.05	10.95	9.1	7.0	6.1	.....	5.85	5.7	5.65	5.85
20	7.7	7.85	11.6	11.1	9.05	7.3	6.35	.....	5.65	5.65	5.6	5.8
21	7.6	7.7	11.0	10.65	9.0	7.2	6.3	5.45	5.65	5.7	5.7	5.85
22	7.7	7.6	10.4	10.5	9.1	6.95	6.1	5.45	5.6	5.7	5.65	5.8
23	8.05	7.85	10.95	10.7	9.5	6.85	6.0	5.4	5.5	5.7	5.65	5.8
24	9.25	7.7	9.95	10.8	9.6	6.8	6.0	5.4	5.5	5.6	5.8	5.8
25	8.95	7.8	9.55	10.8	9.6	6.75	5.9	5.4	5.5	5.6	5.75	5.75
26	8.5	7.8	9.3	10.8	9.2	6.6	5.7	5.45	5.5	5.65	5.8	5.7
27	8.35	7.85	9.1	11.0	9.1	6.7	5.8	5.4	5.5	5.65	5.9	5.8
28	8.2	7.95	9.1	11.45	9.5	6.8	5.8	5.4	5.5	5.6	5.8	5.75
29	8.15	.....	8.95	10.5	9.55	6.7	5.8	5.4	5.65	5.65	5.7	5.7
30	8.05	.....	8.9	9.9	9.4	6.6	5.8	5.45	5.5	5.5	5.7	5.7
31	8.0	.....	9.0	.....	9.4	.....	5.6	5.4	.....	5.5	.....	5.8

Daily discharge, in second-feet, of Stanislaus River at Knights Ferry, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,370	1,910	2,340	3,400	3,760	3,840	598	219	105	117	185	185
2	3,840	1,740	2,400	3,620	3,400	3,620	631	258	105	117	185	185
3	2,860	1,530	2,730	3,540	3,330	2,990	536	258	105	129	185	185
4	2,400	1,480	2,920	3,620	3,190	2,730	536	219	105	129	170	280
5	2,030	1,430	2,860	3,990	2,800	2,030	506	258	156	129	185	478
6	1,970	1,380	2,920	3,840	2,730	1,910	478	129	105	129	142	349
7	1,910	1,530	2,860	3,990	2,540	1,680	451	117	105	129	142	301
8	1,680	1,480	2,920	4,640	4,310	1,580	349	129	105	129	301	301
9	1,680	1,530	3,190	5,170	4,990	1,630	349	129	105	117	258	478
10	1,680	1,630	3,260	4,990	5,170	1,630	349	105	105	129	156	374
11	1,530	1,380	3,330	5,170	4,810	1,680	399	117	105	129	156	631
12	1,430	1,530	3,540	4,150	3,990	1,740	478	156	105	185	202	844
13	1,380	1,430	3,540	4,070	4,150	1,630	425	219	129	258	185	566
14	1,740	1,530	3,620	4,720	3,990	1,480	325	185	105	238	202	451
15	1,970	1,530	3,330	4,720	4,230	1,250	325	156	105	219	202	399
16	3,190	1,530	2,860	5,170	3,920	1,040	349	129	117	219	202	374
17	2,400	1,530	2,860	6,060	3,400	1,080	301	142	349	185	219	391
18	1,800	1,380	3,090	6,260	3,190	1,000	325	142	325	185	185	280
19	1,630	1,530	6,700	6,480	3,260	920	349	142	238	185	170	238
20	1,530	1,680	8,000	6,810	3,190	1,160	478	129	170	170	156	219
21	1,430	1,530	6,590	5,850	3,120	1,080	451	117	170	185	185	238
22	1,530	1,430	5,360	5,550	3,260	882	349	117	156	185	170	219
23	1,910	1,680	6,480	5,950	3,840	808	301	105	129	185	170	219
24	3,470	1,530	4,560	6,160	3,990	771	301	105	129	156	219	219
25	3,060	1,630	3,920	6,160	3,990	736	258	105	129	156	202	202
26	2,470	1,630	3,540	6,160	3,400	631	185	117	129	170	219	185
27	2,280	1,680	3,260	6,590	3,260	700	219	105	129	170	258	219
28	2,090	1,800	3,260	7,630	3,840	771	219	105	129	156	219	202
29	2,030	.....	3,060	5,550	3,920	700	219	105	170	170	185	185
30	1,910	.....	2,990	4,470	3,630	631	219	117	129	129	185	185
31	1,850	.....	3,120	.....	3,690	.....	156	105	.....	129	.....	219

NOTE.—Daily discharge determined from a well defined rating curve. Discharge Aug. 18 to 20 estimated.

Monthly discharge of Stanislaus River at Knights Ferry, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	6,370	1,380	2,170	133,000	A.
February	1,910	1,380	1,560	86,600	A.
March	8,000	2,340	3,740	230,000	B.
April	7,630	3,400	5,150	306,000	B.
May	5,170	2,540	3,690	227,000	B.
June	3,840	631	1,480	88,100	A.
July	631	156	368	22,600	A.
August	258	105	146	8,980	A.
September	349	105	142	8,450	A.
October	258	117	162	9,960	A.
November	301	142	193	11,500	A.
December	844	185	313	19,200	A.
The year	8,000	105	1,590	1,150,000	

STANISLAUS WATER CO.'S CANAL NEAR KNIGHTS FERRY, CAL.

This canal diverts water from the right bank of Stanislaus River at a point about 3 miles above Knights Ferry. At some distance below the intake the Schell ditch diverts a small quantity of water from the main canal for irrigation. The flow in the ditch, as determined by measurement in 1909, is about 6 second-feet and is assumed to be constant. About half a mile above Knights Ferry is another diversion from the main canal through a pressure pipe to the power house on the bank of the river, and the water thus diverted is used for power and then returned to the river about 1,000 feet above the gaging station.

The gaging station, which is on the main canal below all diversions, is on the Oakdale road about one-half mile from Knights Ferry and about 200 feet below the point where the canal passes under the flume of Schell ditch, in the NW. $\frac{1}{4}$ sec. 29, T. 1 S., R. 12 E., M. D. B. and M. It was established June 11, 1904.

The gage is a vertical staff on the left bank at a private bridge across the canal about 20 feet below the foot bridge from which discharge measurements are made.

The rating curve for 1910 is well defined and the record is excellent.

Discharge measurements of Stanislaus Water Co.'s canal at Knights Ferry, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 3	J. E. Stewart	9	17	2.60	49
Mar. 31	do	9	14	2.40	40
May 17	do	9.6	22	3.12	78
June 27	do	9.2	20	2.92	63
July 16	do	9.4	18	2.78	54
Aug. 27	do	9.1	12	2.02	25
Nov. 1	W. V. Hardy	9	15	2.30	37

Daily gage height, in feet, of Stanislaus Water Co.'s canal at Knights Ferry, Cal., for 1910.

[Otto Dolling, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	2.6	2.65	2.35	3.3	3.0	3.2	0.7	2.45	2.35	2.0	2.5
2	2.85	2.6	2.75	2.35	3.3	3.4	3.1	.....	2.55	2.55	2.45	2.0
3	2.6	2.55	2.65	2.6	3.45	3.25	3.1	.....	2.55	2.5	2.5	2.4
4	2.55	2.55	2.6	2.45	3.55	3.2	2.85	.65	2.6	2.65	2.55	2.6
5	2.6	2.6	2.7	1.9	3.4	3.1	2.85	2.5	2.5	2.6	2.6	2.45
6	2.55	2.6	1.45	2.1	3.5	3.15	3.05	2.8	2.5	2.55	2.6	2.35
7	2.5	2.55	3.3	1.9	3.45	3.25	3.0	2.8	2.7	2.5	2.6	2.0
8	2.6	2.5	3.3	1.8	3.25	3.4	3.1	2.65	2.55	2.55	.....	1.85
9	2.6	2.5	2.95	1.9	3.15	3.35	2.9	2.5	2.5	2.65	.7	1.4
10	2.55	2.55	3.15	2.5	3.15	3.25	3.15	2.55	2.95	2.6	2.5	2.35
11	2.55	2.55	3.15	2.5	3.2	3.25	3.0	2.55	2.85	2.55	2.55	2.45
12	2.55	2.65	3.15	2.45	3.1	3.5	3.0	2.5	2.7	1.95	2.55	1.9
13	2.5	2.7	1.45	2.45	3.05	3.35	2.95	2.5	2.5	2.5	2.65	2.45
14	2.55	2.65	2.8	2.45	3.1	3.45	2.85	2.85	2.4	2.55	2.55	1.8
15	2.55	2.7	2.2	2.5	3.4	3.25	3.05	2.65	2.7	2.5	2.5	2.35
16	2.6	2.6	2.5	2.8	3.35	3.3	3.05	2.65	2.8	2.6	2.5	2.4
17	2.55	2.65	2.5	2.8	3.4	3.3	2.85	2.65	2.8	2.6	2.55	2.5
18	2.55	2.65	2.25	2.8	3.45	3.25	3.0	2.7	2.7	2.55	2.6	2.55
19	2.5	2.7	2.35	2.9	2.95	3.5	2.95	2.05	2.8	2.5	2.5	2.65
20	2.5	2.7	3.15	2.95	3.4	3.45	3.1	2.55	2.6	2.45	2.65	2.5
21	2.5	2.7	2.4	3.2	3.4	3.5	2.6	2.8	2.8	2.5	2.6	2.5
22	.7	2.6	1.85	3.1	3.35	3.55	2.7	2.6	2.7	1.95	2.55	2.4
23	2.6	2.7	2.5	3.3	3.35	3.4	2.9	2.6	2.65	2.5	2.5	2.4
24	2.55	2.6	2.4	3.55	3.4	3.45	2.55	2.6	2.65	2.5	2.5	2.5
25	2.6	2.65	2.45	3.5	2.9	3.4	2.65	2.5	2.65	2.5	2.5	2.7
26	2.55	2.65	1.9	3.2	3.35	3.25	2.95	2.55	2.6	2.5	2.5	2.45
27	2.6	2.7	2.45	2.75	3.45	3.05	2.7	2.6	2.6	2.55	2.65	2.35
28	2.6	2.65	2.35	3.4	3.25	2.4	3.1	2.65	2.5	2.5	2.55	2.45
29	2.6	.....	2.35	3.2	2.5	3.25	2.75	2.65	2.6	2.6	2.55	2.45
30	2.7	.....	2.45	3.35	3.45	3.2	2.6	2.6	2.55	2.65	2.5	2.45
31	2.5	.....	2.35	.....	3.4	.....	2.75	2.5	.....	2.55	.....	2.45

NOTE.—Water was out of canal during part of day January 22, August 1 and 4, and wholly out August 2 and 3.

Daily discharge, in second-feet, of Stanislaus Water Co.'s canal at Knights Ferry, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	47	47	50	37	89	69	82	0	41	41	23	43
2	60	47	54	37	89	97	75	0	45	45	41	23
3	47	45	50	47	101	86	75	0	45	43	43	39
4	45	45	47	41	109	82	60	0	47	50	45	47
5	47	47	52	20	97	75	60	43	43	47	47	41
6	45	47	10	27	105	78	72	57	43	45	47	37
7	43	45	89	20	101	86	69	57	52	43	47	23
8	47	43	89	17	86	97	75	50	45	45	0	18
9	47	43	66	20	78	93	63	43	43	50	0	9
10	45	45	78	43	78	93	78	45	66	47	43	37
11	45	45	78	43	82	86	69	45	60	45	45	41
12	45	50	78	41	75	105	69	43	52	22	45	20
13	43	52	10	41	72	93	66	43	43	43	50	41
14	45	50	57	41	75	101	60	60	39	45	45	17
15	45	52	31	43	97	86	72	50	52	43	43	37
16	47	47	43	57	93	89	72	50	57	47	43	39
17	45	50	43	57	97	89	60	50	57	47	45	43
18	45	50	33	57	101	86	69	52	52	45	47	45
19	43	52	37	63	66	105	66	25	57	43	43	50
20	43	52	78	66	97	101	75	45	47	41	50	43
21	43	52	39	82	97	105	47	57	57	43	47	43
22	0	47	18	75	93	109	52	47	52	22	45	39
23	47	52	43	89	93	97	63	47	50	43	43	39
24	45	47	39	109	97	101	45	47	50	43	43	43
25	47	50	41	105	63	97	50	43	50	43	43	52
26	45	50	20	82	93	86	66	45	47	43	43	41
27	47	52	41	54	101	72	52	47	47	45	50	37
28	47	50	37	97	85	39	75	50	43	43	45	41
29	47	.....	37	82	43	86	54	50	47	47	45	41
30	52	.....	41	93	101	82	47	47	45	50	43	41
31	43	.....	37	.....	97	.....	54	43	.....	45	.....	41

NOTE.—Daily discharge determined from a well defined rating curve.

Monthly discharge of Stanislaus Water Co.'s canal at Knights Ferry, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	60	0	44.6	2,740	A.
February	52	43	48.4	2,690	A.
March	89	10	47.3	2,910	A.
April	109	17	54.8	3,260	A.
May	109	43	88.7	5,450	A.
June	109	39	89.0	5,300	A.
July	82	45	64.3	3,950	A.
August	60	0	41.6	2,560	A.
September	66	39	49.1	2,920	A.
October	50	22	43.4	2,670	A.
November	50	0	41.3	2,460	A.
December	52	9	37.1	2,280	A.
The year	109	0	54.1	39,200	

Daily discharge, in second-feet, of Stanislaus River, Stanislaus Water Co.'s canal, and Schell ditch at Knights Ferry, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,420	1,960	2,400	3,440	3,860	3,920	686	225	152	164	214	234
2	3,910	1,790	2,460	3,660	3,500	3,720	712	264	156	168	232	214
3	2,910	1,580	2,790	3,590	3,440	3,080	617	264	156	178	234	230
4	2,450	1,530	2,970	3,670	3,300	2,820	602	225	158	185	221	333
5	2,080	1,480	2,920	4,020	2,900	2,110	572	307	205	182	238	525
6	2,020	1,430	2,940	3,870	2,840	1,990	556	192	154	180	195	392
7	1,960	1,580	2,960	4,020	2,650	1,770	526	180	163	178	195	330
8	1,730	1,530	3,020	4,660	4,400	1,680	430	185	156	180	307	325
9	1,730	1,580	3,260	5,200	5,070	1,730	418	178	154	173	264	493
10	1,730	1,680	3,340	5,040	5,250	1,730	433	156	177	182	205	417
11	1,580	1,430	3,410	5,220	4,900	1,770	474	168	171	180	207	678
12	1,480	1,590	3,620	4,200	4,070	1,850	553	205	163	213	253	870
13	1,430	1,490	3,560	4,120	4,230	1,730	497	268	178	307	241	613
14	1,790	1,590	3,680	4,770	4,070	1,590	391	251	150	289	253	474
15	2,020	1,590	3,370	4,770	4,330	1,340	403	212	163	268	251	442
16	3,240	1,580	2,910	5,230	4,020	1,140	427	185	180	272	251	419
17	2,450	1,590	2,910	6,120	3,500	1,180	367	198	412	238	270	350
18	1,850	1,440	3,730	6,320	3,300	1,090	400	200	383	236	238	331
19	1,680	1,590	6,740	6,550	3,330	1,030	421	173	301	234	219	294
20	1,580	1,740	8,080	6,880	3,290	1,270	559	180	223	217	212	268
21	1,480	1,590	6,640	5,940	3,220	1,190	504	180	233	234	238	287
22	1,540	1,480	5,380	5,630	3,360	997	407	170	214	213	221	264
23	1,960	1,740	6,530	6,040	3,940	911	370	158	185	234	219	264
24	3,520	1,580	4,600	6,280	4,090	878	352	158	185	205	268	268
25	3,110	1,690	3,970	6,270	4,060	839	314	154	185	205	251	260
26	2,520	1,690	3,570	6,250	3,500	723	257	168	182	219	268	232
27	2,330	1,740	3,310	6,650	3,370	778	277	158	182	221	314	262
28	2,140	1,860	3,300	7,730	3,930	816	300	161	178	205	270	249
29	2,080	.....	3,100	5,640	3,970	792	279	161	223	223	236	232
30	1,970	.....	3,040	4,570	3,800	719	272	170	180	185	234	232
31	1,900	.....	3,160	.....	3,790	.....	216	154	.....	180	.....	266

NOTE.—Daily discharge is the sum of the discharge at the river station, the canal station, and Schell ditch. Flow in Schell ditch assumed to be constant and equal to 6 second-feet, as indicated by measurements made in 1909.

Monthly discharge of Stanislaus River, Water Co.'s canal, and Schell ditch at Knights Ferry, Cal., for 1910.

[Drainage area, 935 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	6,420	1,430	2,280	2.44	2.81	140,000
February	1,960	1,430	1,610	1.72	1.79	89,400
March	8,080	2,400	3,800	4.06	4.68	234,000
April	7,730	3,440	5,210	5.57	6.21	310,000
May	5,250	2,650	3,780	4.04	4.66	232,000
June	3,920	719	1,570	1.68	1.87	93,400
July	712	216	438	.468	.54	26,900
August	307	154	194	.207	.24	11,900
September	412	150	197	.211	.24	11,700
October	307	164	211	.226	.26	13,000
November	314	195	241	.258	.29	14,300
December	870	214	356	.381	.44	21,900
The year	8,080	150	1,660	1.78	24.03	1,200,000

NOTE.—These estimates include the flow in the river, the Stanislaus Water Co.'s canal, and the Schell ditch, but do not include diversions above the station into the Tuolumne basin.

ROSE CREEK NEAR JUPITER, CAL.

This station, which is located just above the bridge at the trail crossing, about 2 miles northwest of Jupiter, in the SE. ¼ sec. 17, T. 3 N., R. 15 E., M. D. B. and M., was established September 8, 1910.

Eagle Creek enters 1½ miles above and Knight Creek 2½ miles below the station. The area drained by Rose Creek is rough and is covered chiefly with brush with some merchantable timber.

The gage is a vertical staff fastened to a tree on the right bank, 100 feet above the bridge.

Discharge measurements are made by wading near the gage.

The channel is composed of gravel and small bowlders and the current is swift. At low and medium stages the stream is confined to one channel. At extreme high water the left bank is overflowed and a second channel is formed.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Rose Creek near Jupiter, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 8	J. E. Stewart			0.02	[a] 0.03
Oct. 25	H. J. Tompkins	3.0	2.2	.35	1.2
Dec. 10	do	3.5	2.0	.58	3.9

[a] Estimated.

NOTE.—Measurements made by wading.

Daily gage height, in feet, of Rose Creek near Jupiter, Cal., for 1910.

[Oliver P. Brownlow, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	0.31	0.41	.....	11	0.48	.....	.....	21	.....	.....	.....
2	.....	.....	.....	12	.....	0.59	.....	22	.....	.....	.....
3	.....	.....	.....	13	.....	.....	0.63	23	.....	.....	.....
4	.30	.....	0.77	14	.....	.....	.....	24	.....	.....	0.50
5	.....	.42	.....	15	.35	.47	.....	25	0.35	.....	.....
6	.....	.....	.64	16	.....	.....	.....	26	0.36	0.61	.....
7	.....	.....	.....	17	.....	.....	.52	27	.....	.....	.51
8	.31	.....	.....	18	.....	.....	.....	28	.....	.52	.....
9	.....	.....	.58	19	.37	.52	.....	29	.38	.51	.....
10	.....	.44	.....	20	.....	.....	.51	30	.....	.....	.50
								31	.....	.....	.....

KNIGHT CREEK NEAR JUPITER, CAL.

This station, which is located at the trail crossing, 5 miles west of Jupiter, in the SE. ¼ sec. 8, T. 3 N., R. 15 E., Mount Diablo Base and Meridian, was established September 9, 1910.

Knight Creek joins Rose Creek about 2 miles below the gage. Above the station a small amount of water is diverted for irrigation.

The gage is a vertical staff fastened to a large alder on the right bank, 10 feet above the trail crossing.

Discharge measurements are made by wading near the gage.

The bed of the stream is composed of gravel and sand and is smooth at the gaging section. There is one channel at all stages.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Knight Creek near Jupiter, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
Sept. 9	J. E. Stewart	.....	.....	0.20	[a]0.05
Dec. 10[b]	H. J. Tompkins	2	1.3	.52	.6

[a] Estimated. [b] Made by wading.

Daily gage height, in feet, of Knight Creek near Jupiter, Cal., for 1910.

[H. C. Summers, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	0.35	.....	16	.....	.....	0.45	.....
2	.....	.....	.....	0.35	17	.....	.....	.5	.....
3	.....	.....	.....	.....	18	.....	.....	.....	0.45
4	.....	.....	.....	.....	19	.....	.....	.....	.....
5	.....	.....	.35	.....	20	.....	.....	.....	.....
6	.....	.....	.....	.....	21	.....	.....	.....	.....
7	.....	.....	.....	.4	22	.....	.....	.35	.....
8	.....	.....	.....	.....	23	.....	.....	.....	.45
9	.....	0.2	.....	.....	24	.....	0.3	.....	.....
10	.....	0.3	.4	.....	25	.....	.....	.....	.....
11	.....	.....	.....	.....	26	.....	.....	.....	.....
12	.....	.35	.....	.....	27	.....	.....	.....	.....
13	.....	.....	.....	.....	28	.....	.35	.....	.....
14	.....	.....	.....	.45	29	.....	.....	.35	.....
15	.....	.3	.....	.....	30	.....	.....	.....	.5
					31	.....	.35	.....	.....

SOUTH FORK OF STANISLAUS RIVER NEAR COLUMBIA, CAL.

This station, which is located at the highway bridge at Italian Bar, in the SE. ¼ sec. 33, T. 3 N., R. 15 E., M. D. B. and M., about 5 miles northeast of Columbia, was established September 6, 1910.

Deer Creek enters about 4½ miles above and Fivemile Creek 1½ miles below the gage. About 11 miles above the station water is diverted for domestic use at Sonora and Tuolumne. The low-water flow at the station is controlled by storage.

The gage is a vertical staff fastened to the middle pier of the bridge.

Discharge measurements at low and medium stages are made by wading about 200 feet below the gage. At high stages fair measurements can be made from the bridge.

The banks are high and wooded and not subject to overflow. The channel is composed of gravel, bed rock, and bowlders and appears permanent.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of South Fork of Stanislaus River near Columbia, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 10	Stewart and Tompkins	9	6.0	0.32	2.4
Oct. 24	H. J. Tompkins	5.5	8.2	.55	5.2
Dec. 9	do	10	9.3	.71	6.9
11	do	20	34	1.00	21

NOTE.—Measurements made by wading.

Daily gage height, in feet, of South Fork of Stanislaus River near Columbia, Cal., for 1910.

[Oliver P. Brownlow, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	0.45	0.50	.....	11	0.80	.....	.....	21	.....	.....	.....
2	.....	.....	.....	12	.....	0.72	.....	22	0.62	.....	.....
3	.....	.....	.....	13	.....	.....	0.76	23	.....	.....	.....
4	.43	.....	0.95	14	.....	.....	.....	24	.....	.....	0.69
5	.....	.51	.....	15	.56	.62	.....	25	.70	.....	.....
6	.....	.....	.72	16	.....	.....	.....	26	.....	0.82	.70
7	.....	.....	.....	17	.....	.....	.70	27	.....	.....	.....
8	.41	.54	.....	18	.57	.....	.....	28	.....	.....	.....
9	.....	.....	.71	19	.....	.....	.....	29	.49	.71	.....
10	.....	.....	.....	20	.....	.61	.71	30	.....	.....	.....
								31	.....	.....	.70

CALAVERAS RIVER BASIN.

CALAVERAS RIVER AT JENNY LIND, CAL.

Calaveras River drains an area on the western slope of the Sierra, north of the Stanislaus basin and south of the Mokelumne basin. The total area of this basin above the border of San Joaquin Valley is about 500 square miles.

Calaveras River is formed by the confluence of its North and South forks near San Andreas, and flows southwestward to its junction with the lower San Joaquin, a few miles west of Stockton. Its total length is about 80 miles, of which 35 miles are in the valley and 45 miles in the mountains.

The basin is almost wholly a foothill region. The hills are low, and here and there they are separated by small, irregular valleys. The highest point in the basin is 6,000 feet in altitude, but only a very small part exceeds 4,000 feet.

The gaging station, which is located at the wagon bridge on the Milton road, about one-fourth mile from Jenny Lind post office, in the SE. ¼ sec. 22, T. 3 N., R. 10 E., M. D. B. and M., was established December 1, 1906, by the United States Weather Bureau, and has been rated by the Geological Survey. The records are of greatest immediate value in devising protective measures against the flooding of the city of Stockton during the winter.

The station is well up in the foothills, and there are a few small intermittent tributaries below. Cosgrove, Slate, and Bear creeks enter about 5 miles above the station. North and South forks unite about 15 miles above.

No water is diverted immediately above the station. The acquired water rights are for mining and power operations.

The gage, the datum of which has not been changed since the station was established, is a vertical staff in two sections on the right bank.

Discharge measurements are made from the bridge near the gage.

The conditions for obtaining accurate discharge data are not very good. At low stages the stream at the station is about 100 feet wide and 2 feet deep, and the current is very sluggish. A considerable change in flow makes very little difference in the gage height, so that more or less error arises from the fact that the gage record is only to tenths of feet. At low stages measurements can be made at other sections by wading, thus eliminating inaccuracies from that source. At flood stages the current is very swift and the channel, which is composed of gravel and cobblestones, shifts slightly.

The 1910 rating curve is well defined and the record is fairly satisfactory.

The United States Weather Bureau furnished the gage height record for the periods January 1 to March 11 and November 1 to December 31.

Discharge measurements of Calaveras River at Jenny Lind, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 29	J. E. Stewart	130	368	1.31	519
Mar. 12	do	130	306	.80	238
29	do	130	394	1.30	493
May 21	do	117	234	.07	67
June 25[a]	do	71	80	− .21	21
July 15[a]	do	25	8.2	− .47	5.8

[a] Measurement made by wading.

Daily gage height, in feet, of Calaveras River at Jenny Lind, Cal., for 1910.

[Paul F. Sinclair, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.2	1.0	0.7	1.05	0.45	0.0	−0.28			−0.2	−0.2	0.0
2	2.2	.9	.7	1.0	.4		− .3			− .2	− .2	.0
3	2.0	.8	.7	.95	.4		− .3			− .2	− .2	.0
4	1.5	.8	.7	.9	.35		− .3				− .2	.1
5	1.1	.8	.7	.9	.35		− .32				− .2	.1
6	.7	.8	.7	.85	.35						− .2	.1
7	.6	1.0	.6	.85	.3						− .2	.1
8	.6	1.0	.6	.8	.3						− .15	.1
9	.6	1.0	.6	.75	.3						.15	.0
10	.6	1.1	.5	.75	.25						− .1	.0
11	.6	1.0	.5	.8	.25						− .1	.0
12	.5	.9	.8	.75	.3						− .05	.4
13	.5	.8	.75	.7	.25						− .05	.2
14	.9	.8	.8	.65	.25		− .32				− .05	.1
15	1.6	.8	.8	.6	.2		− .35				.0	.0
16	3.3	.8	.8	.6	.2		− .38				− .05	
17	1.6	.8	.75	.55	.2		− .4				− .05	.0
18	1.6	.8	.8	.55	.2		− .45				.0	.0
19	1.6	.8	.9	.55	.15		− .48				.0	.0
20	1.5	.8	1.25	.5	.15		− .5				.05	.0
21	1.3	.8	2.5	.5	.15		− .5				.05	.0
22	1.3	.8	3.6	.5	.15		− .52			− .2	.05	.0
23	1.3	.9	4.4	.45	.15		− .52				.0	.0
24	3.2	.9	2.5	.4	.1		− .55				.0	.0
25	2.0	.9	2.0	.35	.1	− .2	− .55				.05	.0
26	2.2	.7	1.7	.35	.1	− .23	− .55				.2	.0
27	1.8	.7	1.5	.35	.05	− .22	− .58				.15	.0
28	1.7	.7	1.2	.5	.05	− .25	− .58				.15	.0
29	1.3		1.1	.5	.05	− .27	− .58				.0	.0
30	1.0		1.1	.45	.05	− .28	− .6				.0	.0
31	.9		1.05		.0		− .6					.0

NOTE.—The record for the periods Jan. 1 to Mar. 11, and Nov. 1 to Dec. 31, were furnished by the United States Weather Bureau. The observer was absent June 1 to 24. No record was kept for the periods Aug. 1 to Sept. 30, and during most of the month of October. Probably no flow during most of the months of August and September.

Daily discharge, in second-feet, of Calaveras River at Jenny Lind, Cal., for 1910.

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,490	330	214	355	146	51	17			23	23	51
2	1,230	284	214	330	134	50	15			23	23	51
3	1,040	246	214	307	134	49	15			23	23	51
4	625	246	214	284	122	48	15				23	68
5	380	246	214	284	122	46	14				23	68
6	214	246	214	265	122	45	14				23	68
7	185	330	185	265	110	44	14				23	68
8	185	330	185	246	110	43	14				29	68
9	185	330	185	230	110	42	14				29	51
10	185	380	159	230	98	40	14				35	51
11	185	330	159	246	98	39	14				35	51
12	159	284	246	230	110	38	14				43	134
13	159	246	230	214	98	37	14				43	87
14	284	246	246	200	98	36	14				43	68
15	700	246	246	185	87	34	12				51	51
16	2,690	246	246	185	87	33	10				43	51
17	700	246	230	172	87	32	9				43	51
18	700	246	246	172	87	31	7				51	51
19	700	246	284	172	78	30	5				51	51
20	625	246	462	159	78	28	4				60	51
21	493	246	1,550	159	78	27	4				60	51
22	493	246	3,230	159	78	26	4			23	60	51
23	493	284	4,980	146	78	25	4				51	51
24	2,530	284	1,550	134	68	24	3				51	51
25	1,040	284	1,040	122	68	23	3				60	51
26	1,230	214	780	122	68	21	3				87	51
27	860	214	625	122	60	21	2				78	51
28	780	214	432	159	60	19	2				78	51
29	493		380	159	60	17	2				51	51
30	330		380	146	60	17	2				51	51
31	284		355		51		2					51

NOTE.—Daily discharge determined from a rating curve fairly well defined. Discharge estimated June 2 to 24 and July 6 to 13. Channel probably dry during the greater part of August and September. There was probably little change in conditions of flow during October.

Monthly discharge of Calaveras River at Jenny Lind, Cal., for 1910.

[Drainage area, 395 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	4,490	159	795	2.01	2.32	48,900	A.
February	380	214	269	.681	.71	14,900	A.
Mar	4,980	159	642	1.63	1.88	39,500	A.
April	355	122	205	.519	.58	12,200	A.
May	146	51	91.8	.232	.27	5,640	B.
June	51	17	33.9	.086	.10	2,020	C.
July	17	2	9.0	.023	.03	555	C.
August			.4	.0010	.001	25	D.
September			.0	.0000	.000	0	
October			23.0	.058	.07	1,410	D.
November	87	23	44.8	.113	.13	2,670	B.
December	134	51	58.1	.147	.17	3,570	B
The year	4,980	0	182	.461	6.26	131,000	

NOTE.—Monthly means for August and October estimated from general knowledge of the river during these months. The estimate of zero flow for the month of September is approximate.

MOKELUMNE RIVER BASIN.

GENERAL FEATURES.

The Mokelumne River basin lies on the western slope of the Sierra, north of the Calaveras and Stanislaus River basins, and south of American River basin. Strictly speaking the area drained by Cosumnes River, and several other small tributaries which enter many miles west of the valley border, should be considered as a part of the Mokelumne basin, but this area contributes nothing to the flow of Mokelumne River above the lower Sacramento and San Joaquin delta region. The total area of the basin above the valley rim, exclusive of that drained by the Cosumnes, is about 640 square miles.

The Mokelumne rises in glacial lakelets in Alpine County at an altitude of nearly 10,000 feet above sea level, and flows southwestward to its junction with the lower San Joaquin, about 25 miles northwest of Stockton. It has a total length of about 140 miles, of which approximately 90 miles are in the mountains. For the greater part of its course it forms a boundary between Amador County on the north and Calaveras County on the south. The principal branches are North, Middle, and South forks, which unite about 5 miles above Electra and nearly 40 miles above the rim of the valley. Bear River is tributary to North Fork from the north.

MOKELUMNE RIVER NEAR CLEMENTS, CAL.

This station, which is located at the highway bridge about 1 mile north of Clements, in the NW. ¼ sec. 15, T. 4 N., R. 8 E., M. D. B. and M., was established October 28, 1904.

No important tributaries enter for many miles above or below the station. The three forks unite about 30 miles above Clements, and Cosumnes River enters from the north about 30 miles below Clements.

Several ditches take water for use in mining and in power development in the Mokelumne basin, but most of the water is returned to the river. No water is diverted immediately above the station, except for local irrigation on the bottom lands adjacent to the river. In the upper part of the basin some water is probably diverted into contiguous basins. The acquired water rights on the lower part of the stream probably take the larger part, if not all, of the minimum flow.

The low-water section of the gage is an inclined staff, the upper portion is painted on the pier near the right end of the bridge. No change has ever been made in the gage datum.

Discharge measurements are made from the bridge.

The channel, which is composed of sand and gravel, is subject to slight changes during high water. The 1910 rating curve is well defined and the record is good.

Discharge measurements of Mokelumne River near Clements, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 19	J. E. Stewart	193	416	5.83	1,030
Mar. 13	do	270	918	7.45	2,230
28	do	259	862	7.24	2,050
May 20	do	265	1,110	8.26	3,020
June 24	do	115	269	4.62	408
July 14	do	112	172	3.81	153
Aug. 4[a]	W. V. Hardy	70	67	3.25	60
Oct. 21[a]	J. E. Stewart	80	94	3.60	127

[a] Measurement made by wading.

Daily gage height, in feet, of Mokelumne River near Clements, Cal., for 1910.

[Reba Gaskill, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.0	6.05	6.7	7.2	7.75	8.35	4.25	3.4	3.35	3.25	3.65	3.9
2	7.45	5.95	6.5	7.15	7.7	8.3	4.15	3.4	3.15	3.25	3.75	4.05
3	6.45	5.85	6.7	7.15	7.3	7.8	4.1	3.3	3.25	3.25	3.65	4.4
4	6.35	5.8	6.9	7.2	7.8	7.75	4.05	3.25	3.2	3.5	3.55	5.1
5	6.1	5.8	6.9	7.1	7.7	6.75	3.9	3.3	3.25	3.4	3.7	4.8
6	6.0	5.8	7.0	7.3	8.45	6.15	4.1	3.35	3.1	3.3	3.75	4.75
7	5.9	5.7	6.9	7.55	8.7	6.0	4.0	3.2	3.2	3.4	3.7	4.7
8	5.9	5.9	6.9	7.75	9.25	6.0	3.85	3.15	3.25	3.4	3.6	4.7
9	5.8	5.75	6.95	8.5	10.3	5.85	3.9	2.95	3.1	3.45	3.55	4.55
10	5.65	5.6	7.05	8.5	9.85	6.0	3.9	2.95	3.2	3.5	3.55	4.55
11	5.65	5.55	7.2	8.35	9.8	5.7	3.85	2.85	3.15	3.25	3.7	5.25
12	5.6	5.5	7.4	7.65	9.6	5.85	4.1	3.05	3.15	3.65	3.75	5.3
13	5.5	5.55	7.3	7.55	9.25	5.7	3.9	3.1	3.1	3.7	4.05	4.85
14	5.75	5.5	7.4	7.85	9.5	5.6	3.85	3.15	3.15	3.6	3.85	4.55
15	6.7	5.55	7.05	8.1	9.55	.....	3.8	3.35	3.3	3.55	3.95	4.9
16	6.55	5.55	6.8	8.4	8.35	.....	3.75	3.6	3.5	3.5	3.9	4.85
17	6.3	5.6	6.8	9.1	8.2	.....	3.75	3.4	3.65	3.45	3.75	4.65
18	6.05	5.45	7.35	9.55	8.05	.....	3.7	3.15	3.9	3.45	3.9	4.5
19	5.8	5.9	9.85	9.75	8.15	.....	3.8	3.25	3.6	3.5	3.85	4.3
20	5.75	5.55	11.4	10.05	8.2	.....	3.9	3.3	3.65	3.6	3.9	4.05
21	5.6	5.5	9.95	9.1	8.3	.....	3.8	3.2	3.65	3.6	3.85	3.9
22	5.55	5.55	9.2	8.9	8.55	.....	4.25	3.25	3.45	3.55	3.95	4.35
23	6.3	5.6	9.4	9.5	8.7	.....	3.7	3.45	3.35	3.75	4.05	4.6
24	7.8	5.5	8.45	9.9	9.2	.....	3.8	3.25	3.25	3.65	4.15	4.2
25	7.35	5.9	8.2	10.0	8.2	4.5	3.7	3.45	3.15	3.55	4.05	3.9
26	6.6	5.8	7.55	10.15	8.3	4.45	3.7	3.35	3.25	3.65	3.95	4.05
27	6.3	5.75	7.3	10.3	8.15	4.45	3.6	3.35	3.2	3.6	4.15	3.95
28	6.15	5.95	7.05	9.65	8.0	4.55	3.7	3.2	3.35	3.65	4.05	3.85
29	6.1	.....	7.0	9.2	7.45	4.4	3.4	3.3	3.3	3.7	4.0	3.95
30	6.1	.....	7.0	8.6	7.85	4.4	3.4	3.25	3.2	3.75	3.95	4.05
31	5.9	.....	7.2	.....	8.25	.....	3.5	3.2	.....	3.75	.....	4.3

Daily discharge, in second-feet, of Mokelumne River near Clements, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,600	1,160	1,620	2,020	2,460	3,000	273	84	76	62	130	181
2	2,220	1,100	1,480	1,980	2,420	2,950	244	84	50	62	149	217
3	1,440	1,040	1,620	1,980	2,100	2,500	230	69	62	62	130	321
4	1,380	1,010	1,780	2,020	2,500	2,460	217	62	56	102	111	610
5	1,200	1,010	1,780	1,940	2,420	1,660	181	69	62	84	139	475
6	1,130	1,010	1,860	2,100	3,080	1,240	230	76	45	69	149	454
7	1,070	950	1,780	2,300	3,310	1,130	204	56	56	84	139	433
8	1,070	1,070	1,780	2,460	3,850	1,130	170	50	62	84	120	433
9	1,010	980	1,820	3,130	4,900	1,040	181	32	45	93	111	375
10	920	890	1,900	3,130	4,450	1,130	181	32	56	102	111	375
11	920	860	2,020	3,000	4,400	950	170	25	50	62	139	685
12	890	830	2,180	2,380	4,200	1,040	230	40	50	130	149	710
13	830	860	2,100	2,300	3,850	950	181	45	45	139	217	498
14	980	830	2,180	2,540	4,100	890	170	50	50	120	170	375
15	1,620	860	1,900	2,770	4,150	830	159	76	69	111	192	520
16	1,520	860	1,700	3,040	3,000	770	149	120	102	102	181	498
17	1,340	890	1,700	3,700	2,860	710	149	84	130	93	149	414
18	1,160	800	2,140	4,150	2,720	660	139	50	181	93	181	356
19	1,010	1,070	4,450	4,350	2,820	610	159	62	120	102	170	288
20	980	860	6,110	4,650	2,860	565	181	69	130	120	181	217
21	890	830	4,550	3,700	2,950	520	159	56	130	120	170	181
22	860	860	3,800	3,500	3,180	475	273	62	93	111	192	304
23	1,340	890	4,000	4,100	3,310	433	139	93	76	149	217	394
24	2,500	830	3,080	4,500	3,800	394	159	62	62	130	244	258
25	2,140	1,070	2,860	4,600	2,860	356	139	93	50	111	217	181
26	1,550	1,010	2,300	4,750	2,950	338	139	76	62	130	192	217
27	1,340	980	2,100	4,900	2,820	338	120	76	56	120	244	192
28	1,240	1,100	1,900	4,250	2,680	375	139	56	76	130	217	170
29	1,200	.....	1,860	3,800	2,220	321	84	69	69	139	204	192
30	1,200	.....	1,860	3,220	2,540	321	84	62	56	149	192	217
31	1,070	.....	2,020	.....	2,900	.....	102	56	.....	149	.....	288

NOTE.—Daily discharge determined from a rating curve well defined between 60 and 3,500 second-feet. Daily discharge June 15 to 24 estimated.

Monthly discharge of Mokelumne River near Clements, Cal., for 1910.

[Drainage area, 642 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	3,600	830	1,340	2.09	2.41	82,400	A.
February	1,160	800	947	1.48	1.54	52,600	A.
March	6,110	1,480	2,390	3.72	4.29	147,000	B.
April	4,900	1,940	3,240	5.05	5.63	193,000	B.
May	4,900	2,100	3,180	4.95	5.71	196,000	B.
June	3,000	321	1,000	1.56	1.74	59,500	A.
July	273	84	172	.268	.31	10,600	B.
August	120	25	64.4	.100	.12	3,960	B.
September	181	45	74.2	.116	.13	4,420	B.
October	149	62	107	.167	.19	6,580	B.
November	244	111	170	.265	.30	10,100	B.
December	710	170	356	.555	.64	21,900	A.
The year	6,110	25	1,090	1.70	23.01	788,000	

NOTE.—Discharge per square mile and run-off in inches are subject to error as some water is probably diverted in the upper part of the basin to contiguous basins.

COSUMNES RIVER AT MICHIGAN BAR, CAL.

Cosumnes River rises on the western slope of the Sierra at an altitude of 7,700 feet, and flows southwestward to its junction with the Mokelumne, about 6 miles east of Walnut Grove. Its total length is about 90 miles. The main stream is formed by the confluence of its three forks, about 45 miles above its mouth and 20 miles above the valley border.

The gaging station, which is located at the Michigan Bar bridge, about 8 miles southwest of Latrobe and not far from the Michigan Bar post office, in the NW. ¼ SE. ¼ sec. 36, T. 8 N., R. 8 E., M. D. B. and M., was established October 29, 1907.

No tributaries enter below the station. Big Canyon Creek joins the main stream from the north about 6 miles above Michigan Bar, and the junction of the three forks is about 14 miles above.

Some water is diverted from the south side of the stream above the station and used for hydraulic mining near Michigan Bar. It is probable that all acquired water rights are for mining operations. Some water is also diverted from North Fork basin to the South Fork of American River.

The gage, the datum of which has not been changed since the station was established, is a vertical staff on the middle pier of the bridge.

Discharge measurements are made from the bridge.

The river bed is composed of sand and gravel and is subject to slight changes. At low stages the current is sluggish at the bridge. Very satisfactory measurements may be made at medium and high stages. No measurements have been made on the diversion ditch. The drainage area above the station is 524 square miles.

Discharge measurements of Cosumnes River at Michigan Bar, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 18	J. E. Stewart	247	727	4.66	1,220
Mar. 11	do	248	738	4.82	1,410
25	do	248	973	5.64	2,820
May 24	do	208	466	3.65	270
July 2[a]	do	37	25	2.90	45
13[a]	do	35	18	2.71	26
Aug. 6[a]	W. V. Hardy	21	10	2.53	10
Oct. 26[a]	J. E. Stewart	29	16	2.68	18

[a] Measurement made by wading.

Daily gage height, in feet, of Cosumnes River at Michigan Bar, Cal., for 1910.

[C. B. Ruman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.1	4.5	4.7	4.8	4.3	3.4	2.9	2.5	2.3	2.5	2.7	2.95
2	5.1	4.5	4.7	4.8	4.2	3.4	2.9	2.5	2.3	2.5	2.7	2.9
3	4.75	4.4	4.8	4.8	4.2	3.4	2.8	2.5	2.3	2.5	2.7	3.0
4	4.55	4.4	4.8	4.75	4.2	3.35	2.85	2.5	2.3	2.5	2.7	3.75
5	4.4	4.3	4.9	4.7	4.1	3.3	2.85	2.5	2.3	2.5	2.7	3.5
6	4.4	4.2	4.85	4.7	4.1	3.3	2.85	2.5	2.35	2.5	2.7	3.3
7	4.3	4.6	4.8	4.7	4.0	3.3	2.8	2.5	2.3	2.5	2.7	3.2
8	4.2	4.55	4.8	4.7	4.0	3.3	2.8	2.5	2.3	2.5	2.7	3.2
9	4.25	4.45	4.8	4.7	4.05	3.25	2.8	2.4	2.3	2.5	2.7	3.2
10	4.2	4.4	4.8	4.7	4.05	3.2	2.75	2.4	2.3	2.55	2.8	3.2
11	4.1	4.3	4.8	4.9	4.0	3.2	2.7	2.4	2.3	2.6	2.8	3.65
12	4.1	4.3	4.8	4.75	4.0	3.2	2.7	2.4	2.4	2.75	2.8	3.8
13	4.0	4.3	4.8	4.7	4.0	3.2	2.7	2.4	2.4	3.0	3.15	3.5
14	4.7	4.35	4.8	4.65	4.0	3.15	2.7	2.4	2.4	2.9	3.05	3.4
15	5.35	4.3	4.7	4.6	3.9	3.15	2.7	2.4	2.4	2.8	2.9	3.3
16	5.5	4.3	4.7	4.6	3.85	3.2	2.7	2.4	2.5	2.7	2.9	3.2
17	5.0	4.25	4.6	4.6	3.8	3.1	2.7	2.4	2.8	2.7	2.9	3.2
18	4.6	4.2	4.7	4.65	3.8	3.1	2.6	2.4	2.9	2.7	2.9	3.1
19	4.45	5.4	5.1	4.65	3.7	3.1	2.6	2.4	2.8	2.7	2.9	3.1
20	4.35	4.8	6.9	4.65	3.7	3.1	2.6	2.4	2.7	2.7	3.0	3.05
21	4.3	4.6	7.2	4.55	3.7	3.05	2.5	2.4	2.65	2.7	2.9	3.0
22	4.4	4.65	6.65	4.5	3.7	3.0	2.5	2.4	2.6	2.7	2.9	3.0
23	4.5	4.7	6.95	4.5	3.7	3.0	2.5	2.4	2.6	2.7	2.9	3.0
24	6.0	4.6	5.95	4.4	3.65	3.0	2.5	2.4	2.65	2.7	2.9	3.0
25	5.25	5.05	5.7	4.4	3.6	3.0	2.5	2.4	2.6	2.7	3.0	3.0
26	4.95	4.8	5.4	4.4	3.6	3.0	2.5	2.4	2.55	2.7	3.35	3.0
27	4.75	4.7	5.15	4.4	3.55	3.0	2.5	2.4	2.55	2.7	3.2	3.0
28	4.65	4.7	5.05	4.4	3.5	2.9	2.5	2.4	2.5	2.65	3.0	3.0
29	4.6	.....	4.95	4.45	3.5	2.9	2.5	2.4	2.5	2.65	3.0	2.95
30	4.5	.....	4.8	4.3	3.5	2.9	2.5	2.35	2.5	2.7	3.0	2.95
31	4.45	.....	4.8	.....	3.5	.....	.....	2.35	.....	2.7	.....	3.0

Daily discharge, in second-feet, of Cosumnes River at Michigan Bar, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,950	995	1,250	1,400	770	160	46	8	2	8	22	54
2	1,860	995	1,250	1,400	676	160	46	8	2	8	22	46
3	1,320	880	1,400	1,400	676	160	32	8	2	8	22	63
4	1,060	880	1,400	1,320	676	145	39	8	2	8	22	326
5	880	770	1,550	1,250	588	130	39	8	2	8	22	196
6	880	676	1,480	1,250	588	130	39	8	3	8	22	130
7	770	1,120	1,400	1,256	504	130	32	8	2	8	22	104
8	676	1,060	1,400	1,250	504	130	32	8	2	8	22	104
9	723	938	1,400	1,250	546	117	32	4	2	8	22	104
10	676	880	1,400	1,250	546	104	27	4	2	11	32	104
11	588	770	1,400	1,550	504	104	22	4	2	14	32	266
12	588	770	1,400	1,320	504	104	22	4	4	27	32	358
13	504	770	1,440	1,250	504	104	22	4	4	63	93	196
14	1,250	825	1,400	1,180	504	93	22	4	4	46	72	160
15	2,280	770	1,250	1,120	428	93	22	4	4	32	46	130
16	2,560	770	1,250	1,120	393	104	22	4	8	22	46	104
17	1,700	723	1,120	1,120	358	82	22	4	32	22	46	104
18	1,120	676	1,250	1,180	358	82	14	4	46	22	46	82
19	938	2,370	1,860	1,180	293	82	14	4	32	22	46	82
20	825	1,400	6,230	1,180	293	82	14	4	22	22	63	72
21	770	1,120	7,200	1,060	293	72	8	4	18	22	46	63
22	880	1,180	5,470	995	293	63	8	4	14	22	46	63
23	995	1,250	6,390	995	293	63	8	4	14	22	46	63
24	3,700	1,120	3,580	880	266	63	8	4	18	22	46	63
25	2,100	1,780	2,980	880	240	63	8	4	14	22	63	63
26	1,620	1,400	2,370	880	240	63	8	4	11	22	145	63
27	1,320	1,250	1,940	880	218	63	8	4	11	22	104	63
28	1,180	1,250	1,780	880	196	46	8	4	8	18	63	63
29	1,120	.....	1,620	938	196	46	8	4	8	18	63	54
30	995	.....	1,400	770	196	46	8	3	8	22	63	54
31	938	.....	1,400	.....	196	.....	8	3	.....	22	.....	63

NOTE.—Daily discharge determined from a rating curve well defined above 8 second-feet.

Monthly discharge of Cosumnes River at Michigan Bar, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	3,950	504	1,320	81,200	A.
February	2,370	676	1,050	58,300	A.
March	7,200	1,120	2,210	136,000	A.
April	1,550	770	1,150	68,400	A.
May	770	196	414	25,500	A.
June	160	46	96.1	5,720	A.
July	46	8	20.9	1,290	A.
August	8	3	5.0	307	B.
September	46	2	10.1	601	B.
October	63	8	19.6	1,210	A.
November	145	22	47.9	2,850	A.
December	358	46	112	6,890	A.
The year	7,200	2	536	388,000	

SACRAMENTO RIVER SYSTEM.

GENERAL FEATURES.

The mountain torrent that forms the head of Sacramento River issues from a small lake, unnamed on the map, lying 6,600 feet above sea level, on Mount Eddy, one of the peaks of the Trinity Mountains. About 8 miles east of this lake, or 12 miles following the course of the stream, it receives Wagon Valley Creek, which is fed by springs emerging from the lava beds at the southwest base of Mount Shasta, springs that are frequently referred to as the source of the Sacramento. About 370 miles south of its junction with Wagon Valley Creek the river unites with the San Joaquin and enters Suisun Bay, 50 miles from San Francisco.

The river is joined by numerous tributaries from the east and west. Those coming from the Sierra Nevada flow almost southwest; those from the Coast Range flow in a general easterly direction. The broad western slope of the Sierra furnishes by far the larger part of the drainage and all the important tributaries. Few of the streams from the Coast Range reach the Sacramento directly but become lost "in the intricate plexus of sloughs which meander through the tule lands bordering the main river. On the east, also, only the larger tributaries reach the Sacramento by a definite channel, and often that becomes exceedingly tortuous." [1]

Of the total fall of the river—6,600 feet from source to sea level—5,913 feet occurs in the 56 miles above the mouth of Pit River and 447 feet more in the 67 miles between Pit River and Red Bluff, leaving only 240 feet of fall for the remaining 250 miles of course.

Above the mouth of Pit River the Sacramento is a comparatively small stream, flowing swiftly in a well-defined channel; below the

[1] Ransome, F. L., The Great Valley of California: Bull. Univ. California, vol. 1, 1893–1896, p. 379.

Pit its magnitude increases, and at Red Bluff, where it enters Sacramento Valley, it becomes a sluggish stream, of small slope and small capacity. It is navigable to Red Bluff, 250 miles above its mouth.

Below the mouth of Stony Creek, for about 100 miles of its lower course, the Sacramento occupies a ridge 5 to 20 feet higher than the troughs of the nearly parallel flood basins on each side, which are 2 to 7 miles from the river. The channel capacity throughout this distance is less than one-third that necessary to carry ordinary floods. The levees that have been constructed to lessen or prevent overflow all fail at one or more places during extreme floods and some fail during ordinary floods. A large amount of water may thus pass from the river into the flood basins and be stored for a time, thus reducing the maximum rate of flow of the Sacramento and increasing the flood period.

The large overflow area on the west side of the Sacramento is divided into two basins—Colusa basin on the north and Yolo basin on the south—by a ridge of detritus brought down by Cache Creek. The flood area on the east side of the river is divided into four basins (called, from north to south, Butte, Sutter, American, and Sacramento) by Marysville Buttes and Feather and American rivers. The total area of these big flood basins is approximately 900 square miles and their combined storage capacity is equivalent to three days' continuous flood flow of all the streams discharging into the valley. When full these basins hold sufficient water to cover the entire valley to a depth of 1.38 feet.

SACRAMENTO RIVER AT CASTELLA, CAL.

This station, which is located at the private highway bridge at Castella, in sec. 22, T. 38 N., R. 4 W., M. D. B. and M., was established October 15, 1910. Castle Creek enters the river about one-half mile above the station.

The gage is a vertical staff on the downstream end of the right abutment of the private highway bridge from which discharge measurements are made.

No estimates of daily or monthly discharge have been prepared for 1910.

The following discharge measurement[1] was made by W. V. Hardy from the highway bridge:

October 8, 1910: Width, 75 feet; area, 106 square feet; discharge, 190 second-feet.

[1] Gage not in position when measurement was made.

Daily gage height, in feet, of Sacramento River at Castella, Cal., for 1910.

[H. O. Wickes, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		2.5	3.0	11		3.0	4.4	21	2.5	2.6	3.0
2		2.5	3.0	12		2.7	3.8	22	2.5	2.7	3.0
3		2.5	5.0	13		2.6	3.5	23	2.5	3.8	3.0
4		2.5	4.0	14		2.6	3.2	24	2.5	5.1	2.9
5		2.5	3.5	15	2.5	2.6	3.1	25	2.5	3.5	2.9
6		2.5	3.2	16	2.5	2.6	3.1	26	2.5	3.1	2.9
7		2.5	3.0	17	2.5	2.7	3.0	27	2.5	3.0	2.9
8		2.7	3.2	18	2.5	2.7	3.0	28	2.5	3.2	2.9
9		2.7	3.4	19	2.5	2.7	3.0	29	2.5	3.2	2.8
10		2.6	4.0	20	2.5	2.6	3.0	30	2.5	3.1	2.8
								31	2.5		2.7

SACRAMENTO RIVER AT ANTLER, CAL.

This station, which is located at the highway bridge at Antler, 200 feet above the mouth of Gregory Creek, in S. E. ¼ sec. 13, T. 35 N., R. 5 W., about 22 miles below the gaging station at Castella, was established November 19, 1910.

Middle Salt Creek enters the Sacramento about 2 miles above and Salt Creek about 3 miles below the station. Pit River, the main tributary of the upper Sacramento, enters about 14 miles below Antler.

The gage is a vertical staff on the downstream end of the pier at the right end of the bridge.

Discharge measurements are made from the bridge.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Sacramento River at Antler, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 18	W. V. Hardy	115	310	(a)	296
Nov. 19	Fred G. Wood	119	341	2.20	306

a Gage not installed.

Daily gage height, in feet, of Sacramento River at Antler, Cal., for 1910.

[C. H. Hamilton, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		3.1	11		4.6	21	2.3	2.6
2		3.4	12		4.7	22	2.5	2.5
3		6.7	13		4.6	23	3.1	2.3
4		5.5	14		3.7	24	4.65	2.4
5		3.9	15		3.5	25	3.7	2.6
6		3.5	16		3.5	26	3.0	2.6
7		3.2	17		3.0	27	2.4	2.6
8		3.7	18		3.0	28	2.5	2.6
9		4.6	19	2.2	3.0	29	3.0	2.5
10		4.6	20	2.15	2.8	30	3.2	2.5
						31		2.5

SACRAMENTO RIVER NEAR RED BLUFF, CAL.

This station, which was established January 28, 1902, to take the place of the gaging station maintained at Jellys Ferry since April 30, 1895, is located in lot 4, sec. 34, T. 28 N., R. 3 W., at the lower end of Iron Canyon, 4 miles above Red Bluff and about 3 miles, by river, below the proposed Iron Canyon dam site, at the location used for stream gaging by the State engineer in 1879, and by the commissioner of public works in 1893 to 1894. Discharge measurements were made in 1901 before the station was regularly established.

The river at this point is straight for 2 or 3 miles. The width between the banks at low water is about 500 feet. The depth of water at low stages averages 6 feet, with a maximum depth of 9 feet. The banks are steep and firm. The river flows in a bed of coarse gravel and cobblestones, with here and there small bowlders. The bedrock is lava.

Discharge measurements are made from a car and cable (830 feet span), 30 feet above the gage.

No important tributaries enter within several miles of the station, above or below. Antelope and Redbank creeks come in about 7 miles and Mill Creek about 16 miles below the station. Paines Creek enters about 3 miles and Battle and Cottonwood creeks about 10 miles above the station. Pit River enters about 40 miles above and Feather River about 100 miles below.

No diversions of any kind are made above the station, and it is believed that no appropriations of nor filings on water have been made.

The flow at the station is not affected by artificial storage.

The gage used by the commissioner of public works was still in place at the cable site and was used from January 28, 1902, the date upon which observations were begun, until December 31, 1903. A second gage was placed on the right bank, 3,200 feet below the cable, January 1, 1904, as no observer could be obtained to continue readings at the cable gage, and it was read until September 28, 1904. On this date the gage was removed to the left bank about 4,000 feet below the gaging station and read until February 12, 1906. Since February 14, 1906, the cable gage has been read. By synchronous readings of the lower gage with that at the cable, all readings have been reduced to equivalent readings for the cable gage. The datum of the cable gage which is read twice a day has remained unchanged.

The rating curve now in use is applicable since the station was established. The record is considered excellent.

Discharge measurements of Sacramento River near Red Bluff, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 24	J. E. Stewart	565	10,100	13.12	57,400
24	do	555	9,300	11.65	50,000
25	do	552	8,550	10.22	40,100
Mar. 18	do	531	6,070	5.60	18,700
July 7	do	500	3,860	1.58	5,590
Aug. 8	do	498	3,720	1.32	4,960
Sept. 14	W. V. Hardy	476	3,630	1.30	4,760
Oct. 5	do	485	3,700	1.40	5,000

Daily gage height, in feet, of Sacramento River near Red Bluff, Cal., for 1910.

[Richard Groebe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.0	5.2	9.45	6.0	3.5	2.15	1.6	1.35	1.25	1.35	1.4	2.5
2	3.75	5.0	9.4	5.9	3.4	2.1	1.6	1.35	1.25	1.35	1.4	2.4
3	3.5	4.65	9.4	5.8	3.5	2.1	1.55	1.35	1.25	1.35	1.4	2.45
4	3.2	4.4	9.4	5.6	3.7	2.1	1.55	1.35	1.25	1.35	1.4	4.9
5	3.0	4.2	9.35	5.5	3.4	2.0	1.6	1.35	1.25	1.4	1.4	3.6
6	2.95	4.0	8.9	5.3	3.3	2.0	1.6	1.35	1.25	1.4	1.4	3.0
7	2.95	4.2	7.8	5.2	3.25	2.0	1.6	1.35	1.25	1.4	1.4	2.6
8	3.0	4.0	7.6	5.1	3.2	1.95	1.55	1.35	1.25	1.4	1.65	2.6
9	3.0	4.65	7.2	5.05	3.2	1.95	1.55	1.30	1.25	1.4	1.7	5.5
10	3.05	4.6	6.9	5.0	3.6	1.95	1.55	1.30	1.25	1.35	1.6	5.5
11	2.95	4.2	6.6	5.6	3.5	1.9	1.55	1.30	1.25	1.4	1.7	5.9
12	2.9	4.0	6.4	5.6	3.25	1.9	1.55	1.30	1.25	1.5	1.7	5.3
13	2.95	4.0	6.3	5.2	3.15	1.9	1.5	1.30	1.3	1.85	1.7	4.6
14	5.2	4.1	6.2	5.0	3.05	1.85	1.5	1.30	1.3	1.55	1.6	4.15
15	6.15	4.55	6.0	4.8	3.0	1.85	1.5	1.30	1.3	1.5	1.6	3.8
16	5.7	4.35	5.85	4.7	2.9	1.9	1.5	1.30	1.45	1.5	1.5	3.45
17	4.5	4.15	5.8	4.6	2.8	1.9	1.45	1.30	1.4	1.45	1.5	3.25
18	3.9	4.0	5.6	4.6	2.7	1.85	1.45	1.30	1.4	1.45	1.6	2.95
19	3.7	6.3	6.6	4.7	2.7	1.8	1.45	1.30	1.4	1.45	1.65	2.7
20	3.45	5.3	8.25	4.6	2.65	1.8	1.45	1.25	1.4	1.4	1.6	2.6
21	3.4	4.95	8.3	4.6	2.6	1.8	1.45	1.25	1.4	1.4	1.6	2.45
22	3.85	6.0	11.0	4.4	2.55	1.8	1.45	1.25	1.4	1.4	1.6	2.3
23	5.0	6.6	12.75	4.3	2.5	1.8	1.40	1.25	1.4	1.4	1.65	2.2
24	11.75	10.1	10.2	4.2	2.5	1.75	1.40	1.25	1.4	1.4	2.8	2.2
25	10.0	18.0	8.4	4.1	2.45	1.75	1.40	1.25	1.4	1.4	4.9	2.1
26	9.2	12.0	7.7	4.1	2.4	1.7	1.40	1.25	1.4	1.4	3.0	2.0
27	6.8	9.8	8.2	4.0	2.4	1.7	1.40	1.25	1.35	1.4	2.4	2.0
28	6.1	9.5	7.5	3.8	2.3	1.65	1.40	1.25	1.35	1.4	2.6	2.0
29	5.6	.....	6.9	3.7	2.3	1.65	1.40	1.25	1.35	1.4	3.0	1.95
30	5.4	.....	6.5	3.6	2.25	1.6	1.40	1.25	1.35	1.4	2.8	1.95
31	5.1	.....	6.2	.....	2.2	.....	1.40	1.25	.....	1.4	.....	1.95

Daily discharge, in second-feet, of Sacramento River near Red Bluff, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12,900	17,400	36,300	20,600	11,200	7,020	5,590	5,000	4,760	5,000	5,110	8,000
2	12,100	16,600	36,100	20,200	10,900	6,880	5,590	5,000	4,760	5,000	5,110	7,710
3	11,200	15,300	36,100	19,800	11,200	6,880	5,470	5,000	4,760	5,000	5,110	7,860
4	10,200	14,400	36,100	19,000	11,900	6,880	5,470	5,000	4,760	5,000	5,110	16,200
5	9,540	13,700	35,800	18,600	10,900	6,610	5,590	5,000	4,760	5,110	5,110	11,500
6	9,380	12,900	33,600	17,800	10,500	6,610	5,590	5,000	4,760	5,110	5,110	9,540
7	9,380	13,700	28,500	17,400	10,400	6,610	5,590	5,000	4,760	5,110	5,110	8,300
8	9,540	12,900	27,600	17,000	10,200	6,480	5,470	5,000	4,760	5,110	5,720	8,300
9	9,540	15,300	25,800	16,800	10,200	6,480	5,470	4,880	4,760	5,110	5,840	18,600
10	9,700	15,100	24,500	16,600	11,500	6,480	5,470	4,880	4,760	5,000	5,590	18,600
11	9,380	13,700	23,200	19,000	11,200	6,350	5,470	4,880	4,760	5,110	5,840	20,200
12	9,220	12,900	22,300	19,000	10,400	6,350	5,470	4,880	4,760	5,350	5,840	17,800
13	9,380	12,900	21,900	17,400	10,000	6,350	5,350	4,880	4,880	6,220	5,840	15,100
14	17,400	13,300	21,400	16,600	9,700	6,220	5,350	4,880	4,880	5,470	5,590	13,500
15	21,200	14,900	20,600	15,900	9,540	6,220	5,350	4,880	4,880	5,350	5,590	12,200

Daily discharge, in second-feet, of Sacramento River near Red Bluff, Cal., for 1910—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Oct.
16	19,400	14,200	20,000	15,500	9,220	6,350	5,350	4,880	5,230	5,350	5,350	11,000
17	14,800	13,500	19,800	15,100	8,910	6,350	5,230	4,880	5,110	5,230	5,350	10,400
18	12,600	12,900	19,000	15,100	8,600	6,200	5,230	4,880	5,110	5,230	5,590	9,380
19	11,900	21,900	23,200	15,500	8,600	6,090	5,230	4,880	5,110	5,230	5,720	8,600
20	11,000	17,800	30,600	15,100	8,450	6,090	5,230	4,760	5,110	5,110	5,590	8,300
21	10,900	16,400	30,800	15,100	8,300	6,090	5,230	4,760	5,110	5,110	5,590	7,860
22	12,900	20,600	44,200	14,400	8,150	6,090	5,230	4,760	5,110	5,110	5,590	7,430
23	16,600	23,200	54,100	14,000	8,000	6,090	5,110	4,760	5,110	5,110	5,720	7,150
24	48,300	39,500	40,000	13,700	8,000	5,960	5,110	4,760	5,110	5,110	8,910	7,150
25	39,000	89,700	31,300	13,300	7,860	5,960	5,110	4,760	5,110	5,110	16,200	6,880
26	35,100	49,700	28,000	13,300	7,710	5,840	5,110	4,760	5,110	5,110	9,540	6,610
27	24,000	38,000	30,300	12,900	7,710	5,840	5,110	4,760	5,000	5,110	7,710	6,610
28	21,000	36,600	27,200	12,200	7,430	5,720	5,110	4,760	5,000	5,110	8,300	6,610
29	19,000	.....	24,500	11,900	7,430	5,720	5,110	4,760	5,000	5,110	9,540	6,480
30	18,200	.....	22,700	11,500	7,290	5,590	5,110	4,760	5,000	5,110	8,910	6,480
31	17,000	.....	21,400	.....	7,150	.....	5,110	4,760	.....	5,110	.....	6,480

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Sacramento River near Red Bluff, Cal., for 1910.

[Drainage area, 9,300 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	48,300	9,220	16,200	1.74	2.01	996,000	A.
February	89,700	12,900	21,800	2.34	2.44	1,210,000	A.
March	54,100	19,000	28,900	3.11	3.58	1,780,000	A.
April	20,600	11,500	16,000	1.72	1.92	952,000	A.
May	11,900	7,150	9,310	1.00	1.15	572,000	A.
June	7,020	5,590	6,280	.675	.75	374,000	A.
July	5,590	5,110	5,320	.572	.66	327,000	A.
August	5,000	4,760	4,860	.523	.60	299,000	A.
September	5,230	4,760	4,940	.531	.59	294,000	A.
October	6,220	5,000	5,170	.556	.64	318,000	A.
November	16,200	5,110	6,510	.700	.78	387,000	A.
December	20,200	6,480	10,200	1.10	1.27	627,000	A.
The year	89,700	4,760	11,200	1.20	16.39	8,140,000	

PIT RIVER BASIN.

GENERAL FEATURES.

Pit River drains an area in the northeastern part of California, chiefly in Modoc, Lassen, and Shasta counties. The river is formed by the union of its North and South forks. The South Fork rises on the western slope of the Warner Mountains about halfway between Warren and Eagle mountains, at an altitude of 8,000 feet above sea level, flows southwestward 10 miles, passing through Eagle Lake, then westward about 10 miles, then turns abruptly and flows northward through a swampy valley to Alturas, where it is joined by the North Fork, which rises about half a mile south of Goose Lake and flows irregularly southward about 16 miles to the junction. The length of South Fork above the junction is about 36 miles, in which distance it falls 3,550 feet; 3,400 feet of this fall is made in the first 15 miles.

Topographically the basin of the North Fork includes the area tributary to Goose Lake and is therefore larger than the basin of the South Fork. Goose Lake is an alkaline water body, 28 miles long and 10 miles in maximum width, lying about two-thirds in California and one-third in Oregon. It is fed by 16 streams in California with an aggregate drainage area of 250 square miles, by annual rainfall on the open surface of the lake (estimated at 14 inches), by 6 streams in Oregon, and probably also by subsurface springs. Normally the lake does not overflow, but for a short time in 1869 it sent a stream southward to the North Fork of the Pit, and it is reported to have overflowed to Pit River in 1881 for more than two hours during a severe storm from the north. The lower end of the lake is bordered by lava beds through which some water may be lost by percolation. Drews Creek, Cottonwood Creek, and Thomas Creek, the principal streams flowing into Goose Lake, drain the southeast slope of a high, timbered ridge near the southern corner of Lake County.

Below Alturas the Pit flows, in general, southwestward to its junction with the upper Sacramento about 12 miles north of Redding.

At Alturas the Pit is 4,500 feet above sea level; at its mouth it is 687 feet; the total fall below the fork is therefore 3,818 feet.

Below the forks the principal tributaries are McCloud River, Squaw Creek, and Fall River from the north, and Burney, Hat, Beaver, Ash, and West Valley creeks from the south. McCloud and Fall rivers are the largest, having a minimum flow of 1,200 to 1,500 second-feet. Hat and Burney creeks also have a minimum flow of several hundred second-feet.

PIT RIVER AT HENDERSON, CAL.

This station, which is located at the ferry, one-third mile above Henderson, in sec. 36, T. 37 N., R. 1 W., was established September 28, 1910.

Nelson Creek enters the river about 1 mile above the station, and Kosk Creek about 1 mile below.

The gage is a vertical staff attached to an alder on the left bank. Discharge measurements are made from a cable 95 feet below the gage.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Pit River at Henderson, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq.-ft.*	*Feet.*	*Sec.-ft.*
Sept. 28	Hardy and Stutt	147	1,020	0.97	2,910
Nov. 12[a]	F. G. Wood	149	1,040	1.04	3,230

[a] Full reliance should not be given to this measurement, as meter weight was too light for some of the high velocities encountered.

Daily gage height, in feet, of Pit River at Henderson, Cal., for 1910.

[T. F. Henderson, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		1.30	11		1.90	21	1.05	1.30
2		1.38	12		1.82	22	1.10	1.35
3		1.52	13		1.78	23	1.10	1.35
4		1.60	14		1.75	24	1.05	1.20
5		1.65	15	0.95	1.60	25	1.00	1.15
6		1.62	16	.95	1.30	26	1.12	
7		1.52	17	1.10	1.30	27	1.18	1.10
8		1.62	18	1.00	1.35	28	1.20	
9		1.70	19	1.00	1.35	29	1.22	
10		1.92	20	1.00	1.30	30	1.28	
						31		

PIT RIVER NEAR YDALPOM, CAL.

This station which is located at Silverthorne Ferry, in sec. 32, T. 34 N., R. 3 W., about 1¾ miles below Ydalpom, about 1 mile below the mouth of Squaw Creek, about 5 miles above the mouth of McCloud River, and 7 miles above the junction with the Sacramento, was established November 16, 1910. By combining these data with the record on the McCloud at Baird, the total flow of Pit River may be determined.

The gage is a vertical staff on an ash tree on the left bank near the ferry.

Discharge measurements are made from a boat a short distance above the ferry cable.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Pit River near Ydalpom, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 16	W. V. Hardy	213	1,810	(a)	3,010
Nov. 16	F. G. Wood	215	1,760	3.03	2,960

[a] Gage not installed.

Daily gage height, in feet, of Pit River near Ydalpom, Cal., for 1910.

[M. D. Rodrigue, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		3.6	11		6.3	21	3.1	3.7
2		3.75	12		5.9	22	3.05	3.65
3		4.5	13		5.65	23	3.3	3.6
4		4.45	14		5.55	24	3.8	3.55
5		4.1	15		5.2	25	4.2	3.5
6		3.85	16	3.03	4.8	26	3.65	3.45
7		3.7	17	3.03	4.5	27	3.6	3.4
8		3.75	18	3.15	4.25	28	3.75	3.35
9		5.4	19	3.1	4.0	29	3.7	3.3
10		5.9	20	3.1	3.85	30	3.65	3.3
						31		3.3

GOOSE LAKE BASIN.

COTTONWOOD CREEK NEAR LAKEVIEW, OREGON.

Cottonwood Creek is tributary to Goose Lake. This station, which is located at a site for a storage dam in sec. 29, T. 38 S., R. 19 E., about 10 miles west of Lakeview, was established November 22, 1908. A dam at this site will store about 30,000 acre-feet of water and in connection with the proposed dam on Drews Creek will afford water sufficient to irrigate about 60,000 acres of land.

A 10-foot Cippoletti weir was installed at the dam site in November, 1908, and a gage was placed above it to measure the head. On January 19, 1909, the weir was lengthened to 15 feet, a footbridge was installed about 1,000 feet below it, and an inclined gage was set on the left bank. Measurements were made by a current meter from the bridge, as the weir had been so damaged by a flood that the abutments leaked. The damage was, however, repaired and comparative readings on both gages were made during most of 1909.

A small channel to the right of the measuring section carries water at high stages; both banks are wooded and are overflowed at flood times. The channel at the lower station is evidently permanent and a good discharge rating curve has been developed. As far as available the records derived from observations of the lower gage have been used in constructing the curve. The weir records used for the earlier period are somewhat uncertain, as the weir may have leaked.

The relation between gage height and discharge is affected by ice during extremely cold weather but evidently only for short periods, so that the accuracy of the determinations of the yearly run-off is not materially impaired.

The creek shows large, diurnal fluctuations during the spring, and, as the gage has been read only once or twice daily, the records for the spring season are subject to considerable error.

The station is maintained in cooperation with the Oregon Valley Land Co., which has furnished the weir data and gage heights.

Discharge measurements of Cottonwood Creek near Lakeview, Oreg., in 1909–10.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1909.					
May 7	R. B. Post	26	41	1.88	118
1910.					
May 17	L. R. Allen	20	17	.85	32
Sept. 28	Allen and Davenport	12	3.8	.15	2.1

Daily gage height, in feet, and discharge, in second-feet, of Cottonwood Creek at weir near Lakeview, Oreg., for 1908–9.

[O. W. Theis, observer.]

Day.	Nov., 1908.		Dec., 1908.		Jan., 1909.		Day.	Nov., 1908.		Dec., 1908.		Jan., 1909.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			0.20	3.0	0.20	3.0	16			0.17	2.4	2.65	145
2			.19	2.8	.22	3.5	17			.17	2.4	2.35	133
3			.14	1.9	.32	6.1	18			.16	2.0	2.20	121
4			.19	2.8	.30	5.5	19			.15	2.0		
5			.24	4.1	.28	5.0	20			.15	2.0		
6			.25	4.2	.32	6.1	21			.16	2.0		
7			.20	3.0	.38	7.9	22	0.30	5.5	.17	2.4		
8			.22	3.6	.30	5.5	23	.29	5.2	.16	2.0		
9			.22	3.6	.30	5.5	24	.25	4.2	.16	2.0		
10			.22	3.2	.30	5.5	25	.24	3.9	.16	2.0		
11			.20	3.0	.26	4.5	26	.19	2.7	.19	2.7		
12			.26	4.2	.29	5.3	27	.20	3.0	.20	3.0		
13			.19	3.0	.30	5.5	28	.27	4.5	.20	3.0		
14			.16	2.2	.31	5.8	29	.21	3.3	.20	3.0		
15			.18	2.5	1.04	35.7	30	.22	3.6	.18	2.6		
							31			.20	3.0		

NOTE.—Crest of weir 10 feet long Nov. 22, 1908, to Jan. 16, 1909, and 11 feet long Jan. 17 to 18, 1909. As no allowance was made for probable leakage through weir, values may be somewhat too small.

Daily gage height, in feet, Cottonwood Creek near Lakeview, Oreg., for 1910.

[C. B. Melott, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.68	0.50		1.42	1.35	0.60	0.48	0.10	0.20	0.20	0.22	0.48
2	.45	1.00	2.60	1.48	1.32	.60	.42	.12	.20	.20	.25	.48
3	.60	1.60	2.45	1.50	1.35	.60	.40	.10	.18	.22	.28	1.12
4	.75	1.65	2.28	1.65	1.30	.55	.38	.10	.18	.25	.30	.75
5	.62	1.00	2.25	1.70	1.15	.50	.38	.12	.18	.22	.35	.78
6	.80	.80	2.00	1.42	1.10	.58	.38	.12	.20	.22	.30	.90
7	.75	.70	1.70	1.48	1.10	.55	.35	.12	.18	.22	.35	.80
8	.60	.65	1.52	1.50	1.08	.58	.35	.15	.20	.20	.32	1.60
9	.50	.55	1.50	1.65	1.10	.55	.35	.15	.20	.20	.30	1.20
10	.50	.55	1.85	1.72	1.08	.55	.35	.18	.20	.18	.30	1.52
11	.40	.52	1.85	1.62	1.05	.52	.30	.20	.18	.20	.32	1.54
12	.40	.55	1.95	1.78	1.02	.55	.25	.12	.18	.40	.38	1.58
13	.42	.62	2.10	1.65	1.02	.52	.25	.18	.18	.35	.35	1.50
14	.45		2.20	1.72	1.00	.52	.22	.15	.20	.32	.35	.92
15		.50		1.65	1.02	.55	.22	.18	.20	.28	.38	.80
16		.48	2.00	1.62	1.02	.55	.22	.18	.20	.28	.30	.70
17	.45	.48	2.10	1.72	1.05	.52	.22	.18	.20	.25	.28	.65
18	.42	.45	2.40	1.75	.98	.50	.22	.15	.22	.25	.32	.95
19	.45	.48	2.60	1.70	.92	.50	.20	.18	.25	.28	.25	.90
20	.32	.60	2.50	1.68	.88	.52	.20	.18	.28	.28	.28	.85
21	.35	.42	2.00	1.60	.80	.52	.20	.15	.28	.30	.28	.90
22	.95	.45	1.50	1.62	.75	.55	.18	.18	.25	.30	.25	.88
23	2.00	.48	1.55	1.65	.80	.52	.15	.15	.25	.30	.65	.62
24	1.80	.50	1.40	1.62	.78	.50	.15	.12	.25	.28	.75	.60
25	1.50	.50	1.30	1.65	.72	.50	.12	.18	.25	.28	.55	.60
26	1.30	.55	1.30	1.60	.72	.48	.12	.15	.25	.28	.42	.58
27	1.00	.55	1.28	1.68	.70	.48	.10	.18	.20	.28	.40	.55
28		1.45	1.20	1.45	.68	.45	.10	.15	.20	.25	.48	.55
29			1.22	1.40	.72	.42	.10	.20	.18	.25	.42	.52
30	.65		1.20	1.42	.68	.40	.10	.19	.20	.28	.50	.55
31	.55		1.18		.65		.10	.18		.20		.45

NOTE.—Relation between gage height and discharge affected by ice Feb. 5 to 6 and Nov. 15 to 16, 1909, probably during part of January and February, 1910, and for short periods at other times during 1909 and 1910.

Comparison with original records shows a few errors and several omissions in gage heights for 1909 published in Water-Supply Paper 270, p. 183. The following record is correct:

Feb.	3	0.55	July	10	0.60	Oct. 13–17	0.12
	17	1.88	Sept.	5	.15	18	.15
	23	1.00		26	.20	19–20	.20
Mar.	3	1.03		27	.20	21–22	.18
	4	1.62		28–30	.22	23	.15
	15	1.62	Oct.	12	.15	Nov. 4	3.00
	31	1.87					

Daily discharge, in second-feet, of Cottonwood Creek near Lakeview, Oreg., for 1909–10.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	.....	18	29	109	99	99	25	7	2	3	4	33
2	.....	18	35	114	114	114	25	7	2	3	4	30
3	.....	16	45	102	135	119	25	6	2	4	6	33
4	.....	18	96	76	158	119	23	6	2	4	4	50
5	.....	18	40	75	164	116	21	6	2	3	4	43
6	.....	18	31	82	130	104	21	5	2	3	4	36
7	.....	16	32	75	122	86	24	4	2	3	4	30
8	.....	14	25	80	114	86	19	4	2	3	4	27
9	.....	12	21	94	119	77	19	4	1	2	4	27
10	.....	13	22	82	109	70	18	4	1	2	4	24
11	.....	13	21	99	94	66	18	4	1	2	8	21
12	.....	16	19	99	89	66	16	3	1	2	8	21
13	.....	20	30	135	84	60	13	3	2	2	8	19
14	.....	16	52	135	80	62	14	3	2	2	18	11
15	.....	17	95	126	80	58	13	3	2	2	29	14
16	.....	31	88	136	80	60	12	3	2	2	35	16
17	.....	122	83	146	77	58	12	3	2	2	13	14
18	.....	60	63	140	75	54	11	3	1	2	14	13
19	196	52	54	124	73	64	11	3	1	3	24	13
20	267	43	46	114	77	58	10	3	1	3	124	14
21	286	27	46	106	75	50	9	2	1	3	135	18
22	148	44	44	106	75	43	10	2	2	3	135	21
23	96	43	37	102	73	42	9	2	2	2	337	23
24	76	19	40	99	74	36	8	2	2	2	270	24
25	56	18	47	106	75	35	9	2	3	2	94	27
26	49	21	55	135	75	31	9	2	3	2	58	24
27	50	21	58	144	94	30	8	2	3	2	43	24
28	60	22	64	124	94	30	8	2	4	3	36	18
29	99	.....	60	114	84	31	8	2	4	3	36	16
30	84	.....	60	109	77	30	7	2	4	4	34	13
31	43	.....	121	.....	75	.....	7	2	.....	4	.....	36
1910.												
1	23	13	230	77	70	18	12	1	5	3	4	12
2	11	43	210	82	68	18	10	2	3	3	4	12
3	18	94	190	84	70	18	9	1	3	4	5	52
4	27	99	168	99	66	16	8	1	3	4	6	27
5	19	43	164	104	54	13	8	2	3	4	8	29
6	30	30	135	77	50	17	8	2	3	4	6	36
7	27	24	104	82	50	16	8	2	3	4	8	30
8	18	21	86	84	49	17	8	2	3	3	7	94
9	13	16	84	99	50	16	8	2	3	3	6	58
10	13	16	119	106	49	16	8	3	3	3	6	86
11	9	14	119	96	46	14	6	3	3	3	7	80
12	9	16	130	112	44	16	4	2	3	9	8	92
13	10	19	146	99	44	14	4	3	3	8	8	84
14	11	16	158	106	43	14	4	2	3	7	8	37
15	11	13	146	99	44	16	4	3	3	5	8	30
16	11	12	135	96	44	16	4	3	3	5	6	24
17	11	12	116	106	46	14	4	3	3	4	5	21
18	10	11	183	109	42	13	4	2	3	4	7	40
19	11	12	210	104	37	13	3	3	4	5	4	36
20	7	13	196	102	35	14	3	3	5	5	5	33
21	8	10	135	94	30	14	3	2	5	6	5	36
22	40	11	84	96	27	16	3	3	4	6	4	32
23	135	12	80	99	30	14	2	2	4	6	21	19
24	114	13	75	96	29	13	2	2	4	5	27	18
25	84	13	66	99	25	13	2	3	4	5	16	18
26	66	16	66	94	25	12	2	2	4	5	10	17
27	43	16	64	92	24	12	1	3	3	5	9	16
28	36	80	58	80	23	11	1	2	3	4	12	16
29	28	.....	60	75	25	10	1	3	3	4	10	14
30	21	.....	58	77	23	9	1	3	3	5	13	13
31	16	.....	56	.....	21	.....	1	3	.....	3	.....	11

NOTE.—Daily discharge determined from discharge rating curve well defined between 2 and 130 second-feet. No correction made for ice.

Discharge Mar. 1, 1910, estimated by comparison with record for Drews Creek.

Monthly discharge of Cottonwood Creek near Lakeview, Oreg., for 1908–1910.

[Drainage area, 30 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1908.							
November 22–30	5.5	2.7	3.99	0.133	0.04	71	C.
December	4.2	1.9	2.76	.092	.11	170	C.
1909.							
January	286	3	65.1	2.17	2.50	4,000	C.
February	122	12	27.4	.913	.95	1,520	B.
March	121	19	50.3	1.68	1.94	3,090	B.
April	146	75	110	3.67	4.10	6,550	C.
May	164	73	95.0	3.17	3.66	5,840	B.
June	119	30	65.1	2.17	2.42	3,870	B.
July	25	7	14.3	.477	.55	879	B.
August	7	2	3.4	.113	.13	209	B.
September	4	1	2.1	.070	.08	125	C.
October	4	2	2.6	.087	.10	160	B.
November	337	4	50.0	1.67	1.86	2,980	B.
December	50	11	23.6	.787	.91	1,450	C.
The year	337	1	42.3	1.41	19.20	30,700	
1910.							
January	135	7	28.7	.957	1.10	1,760	C.
February	99	10	25.3	.843	.88	1,410	C.
March	a230	56	125	4.17	4.81	7,690	C.
April	112	75	94.2	3.14	3.50	5,610	B.
May	70	21	41.4	1.38	1.59	2,550	B.
June	18	9	14.4	.480	.54	857	B.
July	12	1	4.7	.157	.18	289	B.
August	3	1	2.4	.080	.09	148	C.
September	5	3	3.3	.110	.12	196	B.
October	9	3	4.6	.153	.18	283	B.
November	27	4	8.2	.273	.30	488	B.
December	92	11	36.2	1.21	1.40	2,230	B.
The year	230	1	32.4	1.08	14.69	23,500	

a Estimated.

DREWS CREEK NEAR LAKEVIEW, OREGON.

Drews Creek is tributary to Goose Lake. This station, which is located at a highway bridge below the proposed dam site of the Oregon Valley Land Co., about 23 miles west of Lakeview, in sec. 5, T. 40 S., R. 18 E., was established March 1, 1910. The point is below all important tributaries and is designated as station No. 3, as two other sites near by had previously been used. Station No. 1, located at the dam site, was established January 16, 1909. The gage was an inclined staff and discharge measurements were made from a footbridge near by. This gage was read until May 31, 1909. Station No. 2 was located at a dump-car bridge 100 feet below the dam site and was used from November 20, 1909, to February 28, 1910, when it was abandoned in favor of the present site, which affords conditions more favorable for good results.

The gage is read twice daily and the readings indicate that the diurnal fluctuation is not strongly marked except at extreme high

stages. Some ice forms occasionally during the winter, but allowance has been made for its effect, and the accuracy of the record of total run-off is not impaired. The stream bed is usually dry for two or three months; no records have been obtained during the summer, for which period the discharge has been estimated.

Practically all records for this station have been collected by the Oregon Valley Land Co. Final computations have been made and the results prepared for publication by the engineers of the United States Geological Survey.

Discharge measurements of Drews Creek near Lakeview, Oreg., in 1909–10.

Station No. 1.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1909.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 15	J. G. Allen			0.98	162
16	....do			3.93	830
17	....do			3.55	717
18	....do			2.96	536
19	....do			1.37	213
21	....do			1.07	164
22	....do			1.14	180
26	....do			.68	100
28	R. F. Stripling			1.00	156
Mar. 3	....do			1.65	269
4	....do			2.60	433
6	....do			1.10	165
8	....do			1.10	167
9	....do			.66	108
14	....do			1.16	194
17	....do			2.90	547
22	....do			1.41	224
27	....do			1.80	312
29	....do			2.06	356
Apr. 1	....do			2.67	489
3	C. C. Gott			3.45	679
9	....do			2.77	516
10	R. F. Stripling			3.20	621
25	J. G. Allen			2.00	308
May 6	R. B. Post	49	104	1.40	230

Station No. 2.

1909.					
Nov. 23	C. W. Watson	52	261	9.00	1,110
24	W. J. Archer	44	174	7.00	706
26	....do	42	131	4.25	229
Dec. 9	....do	38	98	3.50	72
1910.					
Jan. 25	W. J. Archer	50	322	8.36	1,330

Station No. 3.

1910.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 21	W. J. Archer	62	221	5.00	692
30	....do	51	133	3.75	285
Apr. 7	....do	50	142	3.60	264
19	....do	49	117	3.10	150
25	....do	48	91	2.85	86
May 17[a]	L. R. Allen	30	26	2.25	25.8
17	W. J. Archer	43	62	2.26	28.5
Dec. 11	H. W. Frain	53	161	4.28	440
12	....do	51	130	3.58	270

[a] Measurement made by wading.

Daily gage height, in feet, of Drews Creek near Lakeview, Oreg., for 1909–10.

[Oregon Valley Land Co., observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Nov.	Dec.
1909.								
1		0.9	1.45	2.7	1.6			4.4
2		1.1	1.75	2.95	1.55			3.85
3		1.35	1.95	3.3	1.6			3.55
4		.95	2.6	2.55	1.55			3.15
5		.6	1.45	2.2	1.55			
6		.8	1.5	2.0	1.55			3.15
7		.6	1.0	2.0	1.35			3.0
8		.5	1.1	2.25	1.2			3.1
9		.4	.5	2.75	1.2			3.4
10		.45		3.1	1.05			3.5
11		.4		2.85	1.0			4.5
12		.5	.6	3.05	.9			4.45
13		.8	.75	3.5	.85			4.5
14		.85	1.25	3.5	.7			3.55
15		1.0	1.75	3.5	.7			3.2
16	8.3	3.2	2.4	3.4	.65			3.1
17	6.5	3.9	2.65	3.5	.7			3.0
18	5.1	2.8	1.8	3.2	.55			2.95
19	5.2	1.5	1.8	3.1	.55			2.95
20	6.65	1.1	1.4	2.7	.4		3.0	2.9
21	7.3	1.1	1.35	2.4	.55		7.0	2.8
22	2.0	.7	1.4	2.2	.6		7.0	2.8
23	3.05	1.05	1.35	2.1	.6		9.0	2.65
24	2.45	1.0	1.4	1.95	.45		7.0	
25	2.2	.8	1.35	2.0	.3		5.15	
26	1.6	.75	1.45	2.05	.25		4.3	2.75
27	1.25		1.85	2.15	.5		3.45	2.65
28	2.25	1.0	2.05	2.2	.7		3.85	2.65
29	1.5		2.05	1.9	.75			2.65
30	1.1		1.5	1.8	.55		4.1	2.7
31	.85		2.0		.45			2.9
1910.								
1	2.9	3.55	7.5	4.0	2.9	2.0		
2	2.9	3.5			2.9			
3	2.9	3.5	6.8		2.9			
4	2.8	3.4	5.55	3.8	3.0			
5	2.8	3.0	5.45	3.75	3.0			
6	2.7	3.0	4.9	3.75	2.9	1.8		
7	2.6	3.0	4.85	3.7	2.75			
8	2.65	3.0	4.7	3.7	2.65			4.15
9	2.65	3.0	4.6	3.7	2.6			5.2
10	2.65	3.0	4.8	3.7	2.6			4.85
11	2.65	3.0	4.75	3.7	2.6			4.3
12	2.65	3.0	4.9	3.55	2.6			3.7
13	2.65	3.1	6.4	3.35	2.55			3.05
14	2.65	3.4	5.3	3.3	2.4			2.8
15	2.65	3.25	5.8	3.2	2.4			2.5
16	2.65	3.1		3.2	2.3			2.4
17	2.65	3.1	5.6	3.2	2.25			2.0
18	2.65	3.1	5.6	3.15	2.25			
19	2.65	3.05	6.8	3.1	2.2			
20	2.65	3.0	5.4	3.1	2.2			
21	2.65	3.0	5.05		2.2			
22	3.4	3.0	4.95	3.0	2.15			
23	4.4	3.0	4.85	2.95	2.1			
24	5.35	4.35	4.45	2.9	2.1			
25	8.9	4.6	4.2	2.85	2.1			
26	4.2	4.2	4.3	2.8	2.1			
27	3.65	4.0	4.0	2.8	2.05			
28	3.6	6.4	3.95	2.8	2.05			
29			3.8	2.9				
30	3.65		3.8	2.9	2.0			
31	3.65		3.8		2.0			

NOTE.—Gage heights observed at station No. 1 Jan. 16 to May 31, 1909; at station No. 2 Nov. 19, 1909, to Feb. 28, 1910, and at station No. 3 subsequent to that date.

For the greater part of the time readings were made twice a day. Only one reading Mar. 1 and 3, 1910, and none Mar. 2.

Creek dry from about Aug. 1 to Oct. 1, 1909, and July 1 to Oct. 1 1910.

Considerable ice noted Dec. 18–31, 1910; none reported at any other time.

Daily discharge, in second-feet, of Drews Creek near Lakeview, Oreg., for 1909–10.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Nov.	Dec.
1909.								
1	10	140	229	482	256	.....	.....	228
2	10	172	283	547	247	.....	.....	135
3	10	212	320	640	256	.....	.....	90
4	10	148	458	446	247	.....	.....	45
5	10	98	229	370	247	.....	.....	45
6	10	126	238	330	247	.....	.....	45
7	10	98	156	330	212	.....	.....	34
8	10	86	172	380	188	.....	.....	41
9	10	74	86	495	188	.....	.....	70
10	10	80	90	586	164	.....	.....	83
11	10	74	94	521	156	.....	.....	277
12	10	86	98	573	140	.....	.....	266
13	10	126	119	696	133	.....	.....	277
14	50	133	196	696	112	.....	.....	90
15	500	156	283	696	112	.....	.....	49
16	2,730	612	412	668	105	.....	.....	41
17	1,830	818	470	696	112	.....	.....	34
18	1,240	598	292	612	92	.....	.....	31
19	1,280	238	292	586	92	.....	.....	31
20	1,900	180	220	482	74	.....	34	28
21	2,230	172	212	412	92	.....	710	22
22	330	112	220	370	98	.....	710	22
23	573	156	212	350	98	.....	1,110	15
24	423	156	220	320	80	.....	710	16
25	370	133	212	330	62	.....	357	18
26	256	112	229	340	57	.....	211	20
27	196	134	301	360	86	.....	76	15
28	380	156	340	370	112	.....	135	15
29	238	.....	340	310	119	.....	156	15
30	172	.....	238	292	92	.....	177	17
31	133	.....	330	.....	80	.....	.....	28
1910.								
1	28	90	1,850	370	106	12	.....	10
2	28	83	1,680	351	106	.....	.....	20
3	28	83	1,500	333	106	.....	.....	30
4	22	70	910	314	124	.....	.....	50
5	22	34	870	300	124	.....	.....	70
6	17	34	656	300	106	5	.....	100
7	13	34	639	286	82	.....	.....	200
8	15	34	590	286	68	.....	.....	415
9	15	34	558	286	62	.....	.....	770
10	15	34	622	286	62	.....	.....	639
11	15	34	606	286	62	.....	.....	462
12	15	34	656	247	62	.....	.....	286
13	15	41	1,300	199	56	.....	.....	134
14	15	70	810	188	41	.....	.....	90
15	15	54	1,010	166	41	.....	.....	51
16	15	41	970	166	32	.....	.....	41
17	15	41	930	165	28	.....	.....	12
18	15	41	930	155	28	.....	.....	10
19	15	38	1,500	144	24	.....	.....	10
20	15	34	850	144	24	.....	.....	10
21	15	34	710	134	24	.....	.....	10
22	70	34	673	124	20	.....	.....	8
23	256	34	639	115	17	.....	.....	8
24	470	246	510	106	17	.....	.....	8
25	1,510	298	430	98	17	.....	.....	8
26	214	214	462	90	17	.....	.....	8
27	105	172	370	90	14	.....	.....	8
28	97	742	356	90	14	.....	.....	8
29	101	.....	314	106	13	.....	.....	8
30	105	.....	314	106	12	.....	.....	8
31	105	.....	314	.....	12	.....	.....	8

NOTE.—Daily discharge computed by engineers of United States Geological Survey chiefly from data furnished by the Oregon Valley Land Co. Discharge Jan. 1–15, 1909, estimated by a comparison with Cottonwood Creek records. Discharge Jan. 16–May 31, 1909 (station No. 1), determined from discharge rating curve well defined between 100 and 900 second-feet. Discharge Nov. 19 to Dec. 3, 1909 (station No. 2), determined from a curve fairly well defined between 500 and 1,200 second-feet; uncertain below 500 second-feet. Discharge Dec. 4, 1909, to Feb. 28, 1910 (station No. 2), obtained from a curve fairly well defined between 70 and 1,500 second-feet; approximate below 50 second-feet. Discharge Mar. 1 to Dec. 31, 1910 (except Dec. 1–7 and 18–31, which was estimated), (station No. 3) determined from a curve well defined below 1,200 second-feet. Discharge interpolated for other days on which the gage was not read.

Monthly discharge of Drews Creek near Lakeview, Oreg., for 1909–10.

[Drainage area, 211 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1909.							
January	2,730	10	483	2.29	2.64	29,700	C.
February	818	74	189	.896	.93	10,500	B.
March	470	86	245	1.16	1.34	15,100	B.
April	696	292	476	2.26	2.52	28,300	B.
May	256	57	141	.668	.77	8,670	B.
June	.....	.....	45.0	.213	.24	2,680	
July	.....	0	4.0	.019	.02	246	
August	0	0	0.0	.000	.00	0	
September	0	0	0.0	.000	.00	0	
October	.....	.....	2.0	.0095	.01	123	
November	1,110	.....	148	.701	.78	8,810	C.
December	277	15	69.1	.327	.38	4,250	C.
The year	2,730	0	150	.711	9.63	108,000	
1910.							
January	1,510	15	110	0.521	.60	6,760	D.
February	742	34	97.6	.463	.48	5,420	C.
March	1,850	314	791	3.75	4.32	48,600	C.
April	370	90	201	.953	1.06	12,000	B.
May	124	12	49.1	.233	.27	3,020	B.
June	12	0	4.1	.019	.02	244	
July	0	0	0.0	.000	.00	0	
August	0	0	0.0	.000	.00	0	
September	0	0	0.0	.000	.00	0	
October	.....	.....	5.0	.024	.03	307	
November	.....	.....	10.0	.047	.05	595	
December	770	.....	113	.536	.62	6,950	C.
The year	1,850	0	116	.550	7.45	83,900	

NOTE.—Monthly means for low-water periods estimated by comparison with Cottonwood Creek records. They are only approximate, but do not introduce any appreciable error in the yearly total.

HAT CREEK AT HAT CREEK, CAL.

This station, which is located at the highway bridge in the SE. ¼ sec. 10, T. 34 N., R. 4 E., about 300 yards north of Hat Creek post office, was established September 22, 1910.

The gage is a vertical staff fastened to the right abutment near the downstream end of the bridge.

Discharge measurements are made from the bridge.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Hat Creek at Hat Creek, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 21	W. V. Hardy	17	44	(a)	136
Nov. 11	F. G. Wood	18	43	2.43	154

a No gage installed.

Daily gage height, in feet, of Hat Creek at Hat Creek, Cal., for 1910.

[Fred Seaborn, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1				2.45	16				2.49
2					17				2.47
3			2.41	2.55	18				
4					19			2.41	2.42
5			2.41		20			2.41	2.42
6				2.46	21				
7					22	2.05			
8				2.52	23				
9			2.42		24				2.47
10				2.80	25			2.47	
11			2.45		26			2.45	
12			2.44		27				2.49
13					28		2.55	2.44	2.41
14					29		2.42	2.42	2.43
15			2.42	2.50	30		2.42	2.43	
					31				2.43

KOSK CREEK NEAR HENDERSON, CAL.

This station, which is located in sec. 12, T. 37 N., R. 1 W., at the bridge on E. J. Holm's ranch, 1 mile northwest of forest ranger's camp, about one-fourth mile above the mouth of Baker Creek, and about 3½ miles above the mouth of Kosk Creek, was established October 1, 1910.

The gage is a vertical staff on an alder tree on the left bank.

Discharge measurements are made from the bridge 100 feet below the gage.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Kosk Creek near Henderson, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 27[a]	W. V. Hardy	13	18	(b)	28
Nov. 13	F. G. Wood	15	21	2.96	34

a Made from temporary footbridge one-fifth mile above ranger's cabin. Permanent bridge now building
b Gage not installed.

Daily gage height, in feet, of Kosk Creek near Henderson, Cal., for 1910.

[Harry R. Powers, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	2.88			11	2.98			21	2.91		
2				12	3.02			22	2.92		
3	2.90		5.20	13	3.00	2.96		23		3.80	3.42
4	2.94		4.00	14				24	2.92	4.28	
5	2.92	2.91		15	2.93			25	2.92	3.90	
6	2.91		3.60	16	2.92			26	2.92		
7	2.90	2.91		17	2.92			27	2.92		3.35
8		2.91	4.05	18	2.92			28	2.91		
9	2.90	3.00		19	2.91			29			
10	2.90	2.99		20			3.50	30	2.91	3.45	
								31	2.91		

McCLOUD RIVER AT BAIRD, CAL.

This station, which is located at the United States fishery at Baird, in the NW. ¼ sec. 23, T. 34 N., R. 4 W., about 2,000 feet below the mouth of Bailey Creek and about 2,000 feet above the mouth of Johns Creek, and about 2 miles above the mouth of the McCloud, was established December 22, 1910.

The discharge at this station plus the discharge of Pit River at Silverthorne Ferry, represents the discharge of Pit River at its mouth.

The gage is a vertical staff fastened to an alder tree on the right bank about 600 feet above the hatchery.

Discharge measurements are made from a boat about 100 feet below the gage.

Discharge measurements of McCloud River at Baird, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 17[a]	W. V. Hardy	100	244	(b)	1,100
Dec. 22[c]	F. G. Wood	150	696	2.13	1,320

[a] Made from railroad bridge above junction with Pit River.
[b] No gage installed.
[c] Made from boat 100 feet below gage.

Daily gage height, in feet, of McCloud River at Baird, Cal., for 1910.

[G. H. Lambson, observer.]

December 22	2.13
23	2.13
24	2.10
25	2.05
26	2.03
27	2.01
28	2.00
29	2.00
30	2.00
31	1.98

COTTONWOOD CREEK BASIN.

NORTH FORK OF COTTONWOOD CREEK AT ONO, CAL.

Cottonwood Creek is formed by the junction of its North and Middle forks, of which Middle Fork may be considered the continuation of the main stream. Middle Fork rises on the eastern slope of Trinity Mountains in the southeastern part of T. 30 N., R. 10 W., and winds eastward; it is about 30 miles long and drains an area comprising 261 square miles. North Fork rises on the eastern slope of Bully Choop Mountain and flows very irregularly southeastward to its junction with Middle Fork, a short distance below Gas Point; it is about 20 miles long and drains an area 112 square miles in extent. Below the junction the main creek flows eastward and joins the Sacramento about 5 miles east of the town of Cottonwood opposite the mouth of Battle Creek. The principal tributary below the junction is the South Fork, which in turn receives the Cold Fork. The total area drained by Cottonwood Creek is 929 square miles.

A gaging station was established October 27, 1907, on the North Fork near the center of sec. 11, T. 30 N., R. 7 W., at the highway bridge one-fourth mile west of Ono, a short distance below the mouth of Byron Creek and about 1 mile above the mouth of Eagle Creek.

The gage, the datum of which has not been changed since the station was established, is a vertical staff fastened to the left face of the middle pier of the bridge.

The channel is rather rough and subject to slight change.

At high stages the current is swift and is somewhat obstructed by the center bridge pier. Discharge measurements are made from the bridge.

Several small ditches divert water from the creek above the gaging station. In September, 1908, these ditches carried 14 second-feet. Acquired water rights greatly exceed the low-water flow of the creek.

The 1910 discharge rating curve is fairly well defined and represents an average of all the measurements that have been made since the station was established. The records may be considered very good.

Discharge measurements of North Fork of Cottonwood Creek at Ono, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 26	J. E. Stewart	74	108	5.57	242
Mar. 19	do	75	110	5.54	245
July 8[a]	do	26.6	24	4.45	14
Aug. 9[a]	do	24	16	4.12	3.8
Dec. 20[a]	H. D. McGlashan	43	42	4.81	47

[a] Measurement made by wading.

Daily gage height, in feet, of North Fork of Cottonwood Creek at Ono, Cal., for 1910.

[F. J. Wheelock, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.0	5.3	5.7	5.65	5.2	4.75	4.5	4.2	4.1	4.25	4.5	4.8
2	5.0	5.3	5.7	5.6	5.2	4.8	4.5	4.2	4.1	4.25	4.5	4.8
3	4.95	5.3	5.7	5.6	5.2	4.8	4.5	4.2	4.1	4.3	4.5	5.0
4	4.95	5.25	5.7	5.6	5.2	4.7	4.5	4.2	4.1	4.3	4.5	5.0
5	4.95	5.2	5.65	5.55	5.2	4.65	4.5	4.2	4.15	4.3	4.5	4.9
6	4.9	5.2	5.6	5.55	5.15	4.7	4.5	4.15	4.15	4.3	4.5	4.85
7	4.9	5.2	5.6	5.5	5.15	4.7	4.45	4.15	4.15	4.3	4.5	4.8
8	4.9	5.2	5.55	5.5	5.15	4.7	4.45	4.1	4.15	4.3	4.65	5.15
9	4.9	5.4	5.55	5.5	5.15	4.7	4.4	4.1	4.15	4.3	4.6	5.0
10	4.9	5.3	5.5	5.5	5.15	4.7	4.4	4.15	4.15	4.3	4.55	5.3
11	4.9	5.25	5.5	5.65	5.1	4.7	4.5	4.15	4.15	4.65	4.55	5.2
12	4.9	5.25	5.5	5.5	5.1	4.7	4.4	4.15	4.2	5.45	4.55	5.1
13	5.0	5.25	5.5	5.5	5.05	4.7	4.35	4.15	4.2	4.95	4.55	5.0
14	5.0	5.25	5.5	5.5	5.05	4.7	4.35	4.15	4.2	4.75	4.55	4.95
15	5.1	5.2	5.5	5.45	5.05	4.7	4.35	4.15	4.25	4.7	4.55	4.9
16	5.0	5.2	5.5	5.45	5.0	4.7	4.35	4.15	4.25	4.65	4.55	4.9
17	5.0	5.2	5.45	5.45	5.0	4.7	4.3	4.15	4.25	4.6	4.55	4.9
18	4.95	5.25	5.4	5.4	5.0	4.7	4.3	4.2	4.25	4.6	4.6	4.85
19	4.95	5.25	5.5	5.4	5.0	4.7	4.3	4.2	4.3	4.6	4.55	4.85
20	4.95	5.25	5.7	5.4	5.0	4.6	4.3	4.2	4.3	4.6	4.55	4.8
21	5.05	5.2	6.05	5.4	4.95	4.6	4.3	4.2	4.3	4.55	4.55	4.8
22	5.1	5.6	6.75	5.35	4.95	4.6	4.25	4.2	4.3	4.55	4.55	4.8
23	5.6	5.45	6.1	5.35	4.95	4.6	4.2	4.1	4.3	4.55	4.7	4.8
24	5.9	6.6	5.95	5.3	4.95	4.6	4.2	4.1	4.3	4.55	4.9	4.75
25	5.65	5.9	5.8	5.3	4.95	4.5	4.25	4.1	4.3	4.55	4.8	4.75
26	5.6	5.75	6.2	5.3	4.95	4.5	4.3	4.1	4.3	4.55	4.7	4.75
27	5.5	5.7	5.9	5.3	4.9	4.5	4.25	4.15	4.3	4.55	5.0	4.75
28	5.4	5.7	5.8	5.25	4.9	4.5	4.2	4.15	4.3	4.55	4.85	4.75
29	5.4	.....	5.7	5.25	4.85	4.5	4.2	4.1	4.25	4.5	4.8	4.7
30	5.4	.....	5.7	5.2	4.8	4.5	4.2	4.1	4.25	4.5	4.8	4.7
31	5.4	.....	5.7	.....	4.8	.....	4.2	4.1	.....	4.5	.....	4.7

Daily discharge, in second-feet, of North Fork of Cottonwood Creek at Ono, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	90	175	349	324	143	43	17	5	3.5	6.5	17	50
2	90	175	349	298	143	50	17	5	3.5	6.5	17	50
3	79	175	349	298	143	50	17	5	3.5	8	17	90
4	79	159	349	298	143	36	17	5	3.5	8	17	90
5	79	143	324	275	143	30	17	5	4.2	8	17	68
6	68	143	298	275	129	36	17	4.2	4.2	8	17	59
7	68	143	298	252	129	36	14	4.2	4.2	8	17	50
8	68	143	275	252	129	36	14	3.5	4.2	8	30	129
9	68	211	275	252	129	36	12	3.5	4.2	8	25	90
10	68	175	252	252	129	36	12	4.2	4.2	8	21	175
11	68	159	252	324	115	36	17	4.2	4.2	30	21	143
12	68	159	252	252	115	36	12	4.2	5	232	21	115
13	90	159	252	252	102	36	10	4.2	5	79	21	90
14	90	159	252	252	102	36	10	4.2	5	43	21	79
15	115	143	252	232	102	36	10	4.2	6.5	36	21	79
16	90	143	252	232	90	36	10	4.2	6.5	30	21	79
17	90	143	232	232	90	36	8	4.2	6.5	25	21	79
18	79	159	211	211	90	36	8	5	6.5	25	25	59
19	79	159	252	211	90	36	8	5	8	25	21	59
20	79	159	349	211	90	25	8	5	8	25	21	50
21	102	143	572	211	79	25	8	5	8	21	21	50
22	115	298	1,230	193	79	25	6.5	5	8	21	21	50
23	298	232	609	193	79	25	5	3.5	8	21	36	50
24	467	1,060	501	175	79	25	5	3.5	8	21	68	43
25	324	467	405	175	79	17	6.5	3.5	8	21	50	43
26	298	377	689	175	79	17	8	3.5	8	21	36	43
27	252	349	467	175	68	17	6.5	4.2	8	21	90	43
28	211	349	405	159	68	17	5	4.2	8	21	59	43
29	211	.....	349	159	59	17	5	3.5	6.5	17	50	36
30	211	.....	349	143	50	17	5	3.5	6.5	17	50	36
31	211	.....	349	.....	50	.....	5	3.5	.....	17	.....	36

NOTE.—Daily discharge determined from a rating curve well defined below and fairly well defined above 500 second-feet.

Monthly discharge of North Fork of Cottonwood Creek at Ono, Cal., for 1910.

[Drainage area, 52 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	467	68	139	2.67	3.08	8,550	A.
February	1,060	143	231	4.45	4.63	12,800	A.
March	1,230	211	374	7.20	8.30	23,000	B.
April	324	143	231	4.45	4.96	13,700	A.
May	143	50	105	2.02	2.33	6,460	A.
June	50	17	32	.615	.69	1,900	A.
July	17	5	10.3	.198	.23	633	B.
August	5	3.5	4.26	.082	.09	262	B.
September	8	3.5	5.91	.114	.12	352	B
October	232	6.5	27.3	.525	.60	1,680	B.
November	90	17	29.7	.571	.64	1,770	A.
December	175	36	69.6	1.34	1.54	4,280	A.
The year	1,230	3.5	102	1.96	27.21	75,400	

MILL CREEK BASIN.

MILL CREEK NEAR LOS MOLINOS, CAL.

Mill Creek rises in Shasta County just south of Lassen Peak, at an altitude of about 8,000 feet above sea level, and flows in a general southwesterly direction to its junction with Sacramento River, 1½ miles above Los Molinos.

The drainage basin lies west of Sacramento River and between the drainage basins of Antelope and Deep creeks.

The gaging was established September 28, 1909, by the Los Molinos Land Co., by which it is maintained. It is located one-fourth mile east of the company's dam, one-fourth mile west of the northeast corner of sec. 1, T. 25 N., R. 2 W., 4½ miles northeast of Los Molinos, and 5 miles east of Tehama, Cal.

No water is diverted from the creek above the station. At the dam below the station water is diverted by the company for use on its project in the vicinity of Los Molinos.

The gage is an inclined staff on the right bank. Only an occasional gage height has been obtained at this station as no regular observer is available.

The channel, which is composed of cemented gravel, is practically permanent. The current is swift at medium and high stages. Both banks are high and will not overflow.

Discharge measurements are made from the foot-bridge near the gage.

Discharge measurements of Mill Creek near Los Molinos, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 23	J. E. Stewart	48	139	1.98	460
Mar. 17	do	53	140	1.92	479
May 24	W. B. Clapp	49	139	1.70	404
July 6	J. E. Stewart	44	93	.86	162
Aug. 6	do	43	84	.65	125
Sept. 13	W. V. Hardy	38	84	.63	119

NOTE.—These measurements were made by engineers of the United States Geological Survey.

Gage height of Mill Creek near Los Molinos, Cal., for 1910.

	Feet.		Feet.
Feb. 23	1.80	Aug. 20	0.65
June 25	.90	30	.63
July 1	.90	Sept. 10	.63
9	.87	Oct. 1	.63
10	.87	Dec. 16	1.10
25	.73	30	.79
30	.70		

NOTE.—These gage heights were observed by employees of the Los Molinos Land Co.

STONY CREEK BASIN.

GENERAL FEATURES.

Stony Creek drains an area comprising 828 square miles, lying on the eastern slope of the Coast Range, north of the Cache Creek drainage basin, and south of the Thomes Creek basin, which lies between it and the Cottonwood basin on the north. Of this area about 600 square miles is embraced in an irregular parallelogram which is 10 to 15 miles wide and touches the crest of the range for a distance of 50 or 60 miles. The creek rises in the south end of this

area and flows northward along its eastern border for a distance of about 35 miles, then westward for about 15 miles, and finally southeastward to its junction with the Sacramento near St. John. The total length of the creek is about 90 miles, and its fall about 4,000 or 5,000 feet.

The principal tributaries of Stony Creek are Little Stony Creek from the south end of the area, Briscoe Creek from its middle, Grindstone Creek from its north end; and North Fork, which enters the main creek about 10 miles northwest of Orland.

STONY CREEK NEAR FRUTO, CAL.

This station, which is located at Julian's ranch, in the SW. ¼ NE. ¼ sec. 14, T. 21 N., R. 6 W., about 7 miles northeast of Fruto and 1¾ miles above the proposed mill dam site, was established January 30, 1901.

The only important tributary near the gaging station is Grindstone Creek, which drains an area of 173 square miles and enters from the west a short distance above the station. Salt, Elk, and Briscoe creeks enter the creek some distance above the station from the south. North Fork of Stony Creek, which has a drainage area of about 90 square miles, enters about 12 miles below.

The gage, the datum of which has not been changed since the station was established, is in two sections on the left bank and is read daily, with occasional extra readings during flood periods. The high-water portion is a vertical staff set in a rock excavation about 200 feet above the cable. A sloping auxiliary staff gage, bolted to rock, is read at low stages.

Discharge measurements are made from a car and cable.

The channel is composed of gravel which shifts more or less during high water, when the current is very swift and the stream is several hundred feet wide. The creek is not liable to overflow until it reaches the 15-foot stage on the gage.

The 1910 rating curve is fairly well defined for medium and low stages, but poorly defined for high water. The records are fair.

Discharge measurements of Stony Creek near Fruto, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 25	T. C. Johnson	140	356	6.72	1,460
28	J. E. Stewart	136	246	5.92	968
Mar. 22	T. C. Johnson	167	691	8.6	5,050
23	do	160	566	7.6	3,110
June 13	do	150	62	4.2	53
14	do	150	62	4.2	52
30	do	32	20	4.0	26
July 6	do	37	19	4.0	24
20	do	20	8.5	3.85	4.9
27	do	20	6.9	3.85	4.2

NOTE.—All measurements except that of Jan. 28 were made by the United States Reclamation Service.

Daily gage height, in feet, of Stony Creek near Fruto, Cal., for 1910.

[Lee Julian, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.5	5.7	6.5	6.4	5.1	4.5	4.0	3.7	3.6	3.8	3.9	4.4
2	5.5	5.6	6.4	6.2	5.1	4.5	4.0	3.7	3.6	3.8	3.9	4.4
3	5.6	5.5	6.4	6.0	5.1	4.5	4.0	3.7	3.6	3.8	3.9	4.8
4	5.6	5.4	6.3	6.0	5.0	4.5	4.1	3.7	3.6	3.8	3.9	5.1
5	5.5	5.3	6.3	5.9	5.0	4.4	4.1	3.7	3.7	3.8	3.9	5.2
6	5.4	5.3	6.2	5.8	5.0	4.4	4.0	3.7	3.7	3.8	3.9	5.3
7	5.3	5.7	6.2	5.7	5.0	4.4	4.0	3.7	3.7	3.8	3.9	5.3
8	5.2	5.7	6.2	5.6	5.0	4.4	4.0	3.7	3.7	3.8	3.9	5.3
9	5.2	5.6	6.1	5.6	5.0	4.4	4.0	3.7	3.7	3.9	3.9	5.3
10	5.3	5.7	6.1	5.6	5.0	4.4	4.0	3.7	3.7	3.9	3.9	5.4
11	5.4	5.5	6.0	5.8	5.0	4.4	4.0	3.7	3.7	3.9	3.9	5.5
12	5.4	5.4	6.0	5.8	5.0	4.3	3.9	3.7	3.7	3.9	3.9	5.5
13	5.5	5.3	6.0	5.8	5.0	4.3	3.9	3.7	3.7	3.9	4.0	5.4
14	5.6	5.2	6.0	5.7	5.0	4.3	3.9	3.7	3.7	3.9	4.0	5.4
15	5.8	5.2	5.9	5.7	4.9	4.3	3.8	3.7	3.7	3.9	4.0	5.3
16	5.8	5.2	5.8	5.7	4.9	4.3	3.8	3.7	3.8	3.9	4.0	5.3
17	5.7	5.1	5.7	5.6	4.8	4.3	3.8	3.7	3.8	3.9	4.0	5.3
18	5.6	5.1	5.7	5.6	4.8	4.3	3.8	3.7	3.8	3.9	4.0	5.2
19	5.5	6.1	5.7	5.5	4.7	4.2	3.8	3.7	3.8	3.9	4.0	5.2
20	5.4	6.0	6.4	5.5	4.7	4.2	3.8	3.7	3.8	3.9	4.0	5.1
21	5.4	6.0	10.5	5.5	4.7	4.1	3.8	3.6	3.8	3.9	4.1	5.0
22	5.75	5.9	8.85	5.5	4.6	4.1	3.8	3.6	3.8	3.9	4.1	4.9
23	6.25	6.2	7.6	5.4	4.6	4.1	3.8	3.6	3.8	3.9	4.1	4.8
24	8.25	7.5	7.0	5.4	4.6	4.0	3.7	3.6	3.8	3.9	4.2	4.7
25	7.5	7.3	6.7	5.3	4.6	4.0	3.7	3.6	3.8	3.9	4.8	4.7
26	7.0	7.0	6.5	5.3	4.6	4.0	3.7	3.6	3.8	3.9	4.7	4.7
27	6.7	6.8	8.15	5.3	4.6	4.4	3.7	3.6	3.8	3.9	4.6	4.6
28	6.1	6.5	7.6	5.2	4.6	4.4	3.7	3.6	3.8	3.9	4.5	4.6
29	5.9	.....	7.2	5.2	4.5	4.3	3.7	3.6	3.8	3.9	4.5	4.6
30	5.8	.....	6.8	5.2	4.5	4.1	3.7	3.6	3.8	3.9	4.5	4.5
31	5.8	.....	6.5	.....	4.5	.....	3.7	3.6	.....	3.9	.....	4.5

Daily discharge, in second-feet, of Stony Creek near Fruto, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	480	775	1,580	1,460	370	118	23	1	0.5	2	11	93
2	480	695	1,460	1,220	370	118	23	1	.5	2	11	93
3	540	620	1,460	1,030	370	118	23	1	.5	2	11	220
4	540	550	1,340	1,030	315	118	38	1	.5	2	11	370
5	480	485	1,340	940	315	93	38	1	1	2	11	425
6	425	485	1,220	855	315	93	23	1	1	2	11	485
7	370	775	1,220	775	315	93	23	1	1	2	11	485
8	320	775	1,220	695	315	93	23	1	1	2	11	485
9	320	695	1,120	695	315	93	23	1	1	11	11	485
10	370	775	1,120	695	315	93	23	1	1	11	11	550
11	425	620	1,030	855	315	93	23	1	1	11	11	620
12	425	550	1,030	855	315	72	11	1	1	11	11	620
13	480	485	1,030	855	315	72	11	1	1	11	23	550
14	540	425	1,030	775	315	72	11	1	1	11	23	550
15	690	425	940	775	265	72	2	1	1	11	23	485
16	690	425	855	775	265	72	2	1	2	11	23	485
17	610	370	775	695	220	72	2	1	2	11	23	485
18	540	370	775	695	220	72	2	1	2	11	23	425
19	480	1,120	775	620	180	54	2	1	2	11	23	425
20	425	1,030	1,460	620	180	54	2	1	2	11	23	370
21	425	1,030	9,010	620	180	38	2	.5	2	11	38	315
22	650	940	5,360	620	145	38	2	.5	2	11	38	265
23	1,120	1,220	3,120	550	145	38	2	.5	2	11	38	220
24	3,840	2,960	2,210	550	145	23	1	.5	2	11	54	180
25	2,750	2,640	1,830	485	145	23	1	.5	2	11	220	180
26	2,100	2,210	1,580	485	145	23	1	.5	2	11	180	180
27	1,750	1,960	4,050	485	145	93	1	.5	2	11	145	145
28	1,120	1,580	3,120	485	145	93	1	.5	2	11	118	145
29	940	.....	2,490	425	118	72	1	.5	2	11	118	145
30	855	.....	1,960	425	118	38	1	.5	2	11	118	118
31	855	.....	1,580	.....	118	.....	1	.5	.....	11	.....	118

NOTE.—Daily discharge determined from rating curves applicable as follows: January 1–25, not well defined; January 25–27, by indirect method for shifting channels; January 28–December 31, fairly well defined; discharge June 27–29 increased by water from East Park reservoir.

Monthly discharge of Stony Creek near Fruto, Cal., for 1910.

[Drainage area, 601 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	3,840	320	840	1.40	1.61	51,600	C.
February	2,960	370	964	1.60	1.67	53,500	C.
March	9,010	775	1,910	3.18	3.67	117,000	C.
April	1,460	425	733	1.22	1.36	43,600	B.
May	370	118	240	.399	.46	14,800	B.
June	118	23	73.8	.123	.14	4,390	B.
July	38	1	11.0	.018	.02	676	D.
August	1	.5	.82	.0014	.002	50	D.
September	2	.5	1.43	.0024	.003	85	D.
October	11	2	8.68	.014	.02	534	D.
November	220	11	46.1	.077	.09	2,740	C.
December	620	93	346	.576	.66	21,300	C.
The year	9,010	.5	429	.714	9.705	310,000	

LITTLE STONY CREEK NEAR LODOGA, CAL.

This station, which was established by the United States Reclamation Service in March, 1907, for the purpose of determining the quantity of flood water available for storage in the East Park Reservoir for use on the Orland project, is located at the East Park dam site, 3½ miles northwest of Lodoga, in the NW. ¼ NE. ¼ sec. 3, T. 17 N., R. 6 W., and is about 4 miles above the mouth of the creek. Indian Creek enters Little Stony Creek from the east a short distance above the station. Two small ditches divert water for irrigation, one 4 miles above and the other 1 mile below the station. The total amount diverted is about 5 second-feet.

Since the station was first established several gages at different locations and with independent datums have been used. During the first part of 1910 the gage was an inclined staff on the left bank, 20 feet below the cable from which discharge measurements are made. Since August, 1910, the gage in the East Park reservoir has been used to determine the discharge of the creek.

As the channel is somewhat shifting, the record for high stages is approximate. For medium and low stages the records are fairly good.

Discharge measurements of Little Stony Creek near Lodoga, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 24	F. H. Tillinghast	80	199	5.45	1,190
28	T. C. Johnson	50	71	3.88	175
Mar. 16	....do	40	32	3.55	61

NOTE.—Measurements were made by the United States Reclamation Service.

Daily gage height, in feet, of Little Stony Creek near Lodoga, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.34	3.77	3.75	3.90	3.30	3.00	2.90	2.76				11.73
2	3.31	3.70	3.75	3.82	3.30	2.90	2.90	2.76				11.76
3	3.29	3.65	3.74	3.75	3.30	2.70	2.90	2.76				11.79
4	3.27	3.60	3.74	3.70	3.30	2.70	2.90	2.76				11.82
5	3.06	3.58	3.74	3.68	3.30	2.78	2.90	2.76				12.05
6	2.94	3.57	3.70	3.64	3.28	2.78	2.90	2.76				12.50
7	2.86	3.55	3.65	3.62	3.26	2.78	2.90	2.76				13.10
8	2.87	3.58	3.62	3.60	3.24	2.78	2.88	2.76				13.50
9	2.88	3.75	3.62	3.58	3.20	2.78	2.86	2.76				13.90
10	2.89	3.80	3.80	3.57	3.20	2.78	2.84	2.76				14.30
11	2.99	3.78	3.72	3.55	3.10	2.78	2.82	2.76				15.20
12	3.01	3.76	3.62	3.60	3.10	2.68	2.80	2.76				16.20
13	3.12	3.70	3.62	3.60	3.10	2.68	2.78	2.76				16.70
14	3.21	3.68	3.58	3.58	3.10	2.68	2.78	2.72				17.20
15	3.36	3.66	3.55	3.55	3.10	2.68	2.78	2.70				17.50
16	3.59	3.60	3.55	3.53	3.10	2.68	2.78	2.68				17.80
17	3.62	3.55	3.55	3.51	3.10	2.68	2.78	2.66				18.10
18	3.64	3.52	3.55	3.50	2.70	2.68	2.78	2.64				18.30
19	3.62	3.55	3.55	3.48	2.70	2.68	2.78	2.62				18.50
20	3.61	3.55	3.55	3.46	2.70	2.68	2.76	2.60				18.70
21	3.60	3.55	4.19	3.43	2.90	2.68	2.76	2.58				18.90
22	3.61	3.58	4.82	3.40	3.05	2.68	2.76	2.56				19.10
23	3.78	3.55	4.60	3.38	3.05	2.94	2.76	2.54				19.30
24	5.55	3.58	4.28	3.36	3.05	2.95	2.76	2.52				19.50
25	4.16	3.60	4.12	3.35	3.05	3.28	2.76	2.50				19.70
26	4.09	3.75	4.00	3.34	3.05	3.30	2.76					19.80
27	3.93	3.75	4.31	3.33	3.03	2.92	2.76					19.90
28	3.83	3.75	4.40	3.32	3.00	2.90	2.76					20.00
29	3.69		4.15	3.31	3.00	2.90	2.76					20.10
30	3.66		4.08	3.30	3.00	2.90	2.76					20.20
31	3.60		3.90		3.00		2.76					20.30

NOTE.—Gage heights for December taken from a gage at East Park reservoir. Creek probably dry from Aug. 26 to Nov. 30.

Daily discharge, in second-feet, of Little Stony Creek near Lodoga, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	31	112	106	155	27	7.0	3.0	0.8				1.0
2	28	92	106	127	27	3.0	3.0	.8				1.0
3	26	80	103	106	27	.5	3.0	.8				1.2
4	24	69	103	92	27	.5	3.0	.8				1.2
5	9.7	65	103	87	27	.9	3.0	.8				1.4
6	4.6	64	92	78	25	.9	3.0	.8				4.0
7	2.2	60	80	74	23	.9	3.0	.8				5.5
8	2.4	65	74	69	22	.9	2.6	.8				4.5
9	2.6	106	74	65	18	.9	2.2	.8				4.5
10	2.8	120	120	64	18	.9	1.8	.8				4.0
11	6.6	114	98	60	11.5	.9	1.4	.8				11.0
12	7.4	109	74	69	11.5	.4	1.0	.8				23.0
13	12.8	92	74	69	11.5	.4	.9	.8				8.0
14	19	87	65	65	11.5	.4	.9	.6				5.5
15	33	83	60	60	11.5	.4	.9	.5				5.0
16	67	69	60	56	11.5	.4	.9	.4				5.0
17	74	60	60	53	11.5	.4	.9	.4				5.0
18	78	55	60	51	.5	.4	.9	.3				4.0
19	74	60	60	48	.5	.4	.9	.3				3.5
20	71	60	60	45	.5	.4	.8	.2				3.5
21	69	60	281	41	3.0	.4	.8	.2				3.0
22	71	65	671	37	9.2	.4	.8	.1				3.0
23	114	60	522	35	9.2	4.6	.8	.1				3.0
24	128	65	331	33	9.2	5.0	.8	0				3.0
25	266	69	247	32	9.2	25	.8	0				3.0
26	232	106	192	31	9.2	27	.8					3.0
27	166	106	348	30	8.4	3.8	.8					2.0
28	130	106	400	29	7.0	3.0	.8					1.5
29	90		262	28	7.0	3.0	.8					3.0
30	83		228	27	7.0	3.0	.8					2.5
31	69		155		7.0		.8					2.5

NOTE.—Daily discharge Jan. 1 to Aug. 25 determined from a discharge rating curve fairly well defined. Discharge for December computed by the United States Reclamation Service from gage heights at the East Park reservoir.

Monthly discharge of Little Stony Creek near Ladoga, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	1,280	2.2	101	6,210	B.
February	120	55	80.7	4,480	B.
March	671	60	170	10,500	B.
April	155	27	60.5	3,600	B.
May	27	.5	13.2	812	B.
June	27	.4	3.20	190	C.
July	3	.8	1.48	91	C.
August	.8	.0	.44	27	C.
December	23	1.0	4.24	261	.....

NOTE.—Records for December computed from gage heights taken at the East Park reservoir. The creek was probably dry during the greater part of September, October, and November.

FEATHER RIVER BASIN.

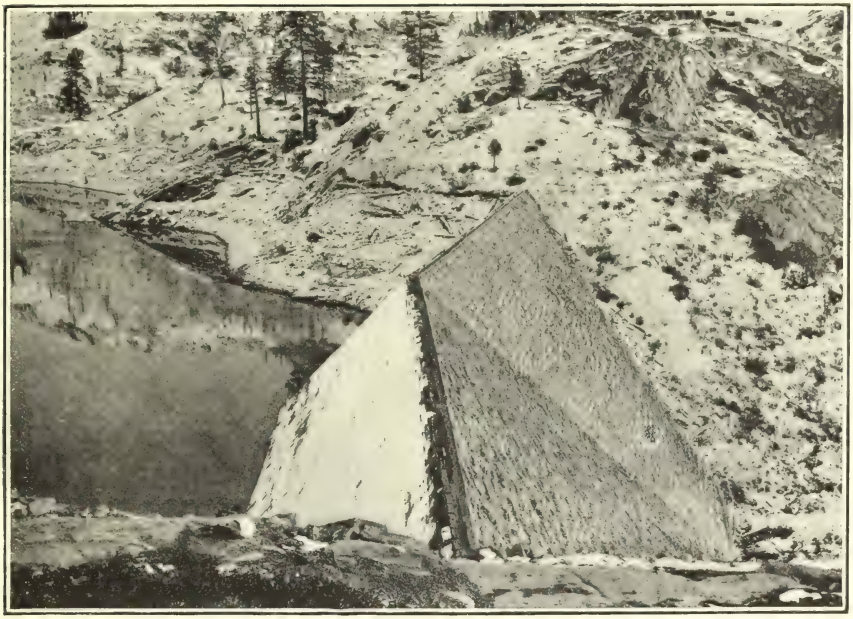
GENERAL FEATURES.

Feather River heads on the crest of the Sierra and takes a general southerly course to its union with the Sacramento about 30 miles south of Marysville and about 15 miles northwest of Sacramento. Its total length is about 175 miles and its drainage area comprises approximately 6,590 square miles, lying on the western slope of the Sierra Nevada, south of the Pit River basin, and north of the American River basin.

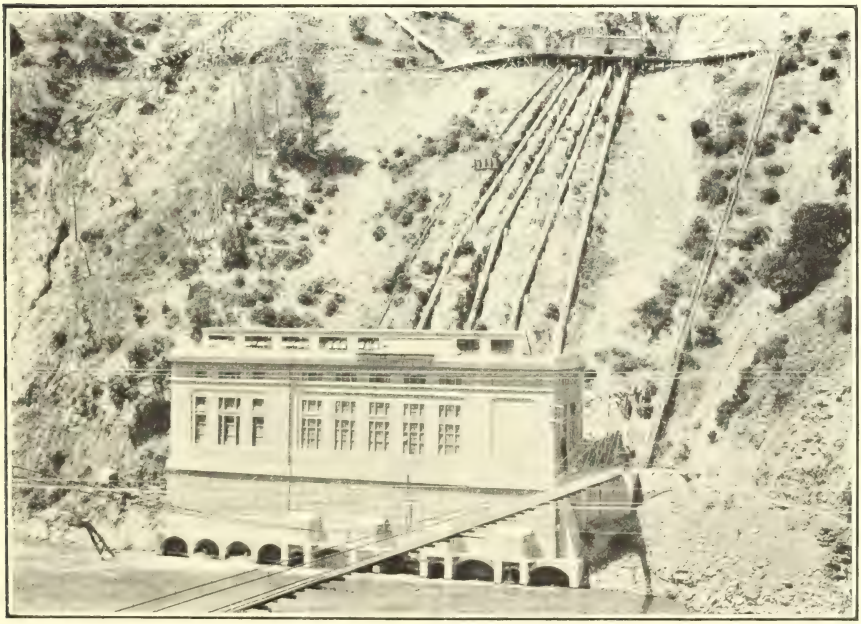
The basin is naturally subdivided into three other comparatively large basins: North Fork basin at the north and west, with a total drainage area of about 2,220 square miles; Middle Fork basin in the center and at the east, with a total drainage area of about 1,340 square miles; and Yuba River basin at the south, with a total drainage area of more than 1,300 square miles.

The drainage basin of the North Fork, here regarded as the main stream, includes the eastern part of Butte, the greater part of Plumas, and the southwestern corner of Lassen counties. The junction of North and Middle forks is in Butte County, about 6 miles northeast of Oroville. The length of North Fork basin does not exceed 75 miles, and its width in Plumas County is about 65 miles. Middle Fork basin is long but comparatively narrow except at its east end, where it broadens out and includes Sierra Valley, a large meadow valley at an altitude of 5,000 feet. Beckwith Pass, which opens into this valley from the east, is the lowest pass in the Sierra Nevada, and has an elevation of about 5,200 feet above sea level. Sierra Valley and the surrounding country are very dry in the summer. The greatest elevation in the Middle Fork basin is about 8,500 feet.

Butt Creek joins North Fork from the west about 12 miles south of Prattville. It has a total drainage area of 74 square miles. Indian Creek enters North Fork from the east about 20 miles southwest of Prattville, and has a total drainage area of about 1,020 square miles.



A. BOWMAN DAM, SOUTH FORK OF YUBA RIVER.



B. GREAT WESTERN POWER CO.'S PLANT ON NORTH FORK OF FEATHER RIVER AT BIG BEND.

Yuba River rises near the crest on the western slope of the high Sierra and flows southwestward to its junction with Feather River at Marysville. The total length of the stream is about 90 miles. Its basin lies south of the Middle Fork of Feather River basin, west of the Truckee River basin and north of the American and Bear River basins, is chiefly in Yuba, Sierra, and Nevada counties, and is one of the principal subdivisions of the Feather River basin. It comprises an area of more than 1,300 square miles in extent. Its extreme length from the mouth of the Yuba to the crest of the Sierra is about 70 miles, and its greatest width is about 35 miles. The most important tributaries are North Fork of Yuba, South Fork of Yuba, and Deer Creek from the east, and North Fork of North Fork and Canyon Creek from the north. A dam on the South Fork of the Yuba is shown on Plate IV, *A*.

Bear River, the principal tributary of the Feather below the Yuba, drains a narrow strip comprising 300 square miles, lying on the western slope of the Sierra below an altitude of 5,500 feet. The river rises near Emigrant Gap, in the extreme northeastern part of its basin, and flows southwestward to its junction with Feather River about 15 miles south of Marysville. It is the boundary line between Nevada and Placer counties and closely parallels the Bear-American divide, which is 1 to 2 miles south of it. Its principal tributaries are Steep Hollow Creek, Greenhorn River, and Wolf Creek, all from the north.

NORTH FORK OF FEATHER RIVER BELOW PRATTVILLE, CAL.

This station, which is located in the canyon at the proposed dam site of the Great Western Power Co., about 3 miles below the Meadow View bridge crossing on the Prattville-Greenville road, and about 5 miles southeast of Prattville, was established by the power company November 22, 1905. (See Pl. IV, *B*.)

Butt Creek enters from the west about 5 miles below the station, and Indian Creek from the east about 15 miles below; North Fork and Hamilton Branch unite about 5 miles above.

Thin sheet ice forms occasionally, but does not materially affect the relation between gage height and discharge.

The bed is rocky and is not likely to change greatly. The current is swift at high water, but its velocity is moderate at other stages. At low water the stream is about 60 feet wide and has a maximum depth of 9 feet.

A staff gage is located 700 feet above the cable section. Gage heights are recorded by automatic register. The datum of the gage has remained unchanged.

Measurements were made from a boat until November 22, 1905, since which time they have been made from a cable and car.

Records at this station are very good.

Determinations of discharge are published as furnished by the company.

Daily discharge, in second-feet, of North Fork of Feather River below Prattville, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	927	862	1,253	1,608	1,690	880	685	620	595	612	616	755
2	899	797	1,331	1,652	1,620	873	685	616	592	620	616	877
3	829	800	1,467	1,660	1,585	857	679	613	592	620	625	914
4	797	812	1,806	1,660	1,590	842	679	609	607	632	625	975
5	804	812	2,147	1,635	1,536	830	679	609	609	635	625	857
6	812	827	2,176	1,646	1,452	819	675	613	607	628	625	751
7	819	837	2,170	1,677	1,392	815	671	613	602	628	625	712
8	808	837	2,176	1,715	1,376	804	671	613	602	625	660	745
9	819	837	2,242	1,770	1,397	797	679	609	602	625	733	1,254
10	819	830	2,280	1,810	1,440	783	682	607	602	625	678	1,800
11	804	857	2,230	1,912	1,457	778	679	609	609	643	698	2,004
12	797	873	2,197	1,865	1,415	770	679	609	609	667	698	1,810
13	789	918	2,200	1,780	1,366	770	682	607	616	652	688	1,405
14	741	960	2,216	1,748	1,342	763	675	602	620	639	660	1,153
15	808	918	2,186	1,728	1,322	759	671	599	635	639	660	988
16	800	873	2,084	1,720	1,298	755	664	595	688	635	642	910
17	800	862	2,084	1,745	1,188	755	656	592	664	628	642	808
18	800	869	2,230	1,793	1,148	751	652	595	652	625	667	783
19	800	865	2,760	1,850	1,121	747	656	595	649	620	667	759
20	800	910	3,368	1,930	1,121	741	671	592	643	616	652	745
21	800	924	3,468	1,939	1,049	737	667	595	639	616	645	733
22	827	931	3,220	1,896	1,106	737	653	595	635	616	660	697
23	924	910	2,817	1,880	1,066	733	648	595	635	616	665	688
24	1,015	1,053	2,444	1,896	1,040	726	649	595	628	616	810	637
25	1,001	1,167	2,158	1,896	1,018	719	646	595	625	616	922	667
26	939	1,070	1,945	1,885	980	715	643	599	625	616	845	635
27	906	1,075	1,859	1,868	948	708	639	589	625	616	810	616
28	887	1,140	1,745	1,806	944	697	635	595	625	616	810	607
29	880	.....	1,647	1,733	927	688	632	595	625	616	810	607
30	850	.....	1,590	1,684	910	685	628	595	625	616	810	602
31	850	.....	1,585	.....	892	.....	625	595	.....	616	.....	607

NOTE.—Determinations of daily discharge furnished by the Great Western Power Co. Discharge Jan. 16 to 21 and Sept. 25 to 29 estimated.

Monthly discharge of North Fork of Feather River below Prattville, Cal., for 1910.

[Drainage area, 506 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	1,015	741	844	1.67	1.92	51,900
February	1,167	797	908	1.79	1.86	50,400
March	3,468	1,253	2,160	4.27	4.92	133,000
April	1,939	1,608	1,780	3.52	3.93	106,000
May	1,690	892	1,250	2.47	2.85	76,900
June	880	685	768	1.52	1.70	45,700
July	685	625	662	1.31	1.51	40,700
August	620	589	602	1.19	1.37	37,000
September	688	592	623	1.23	1.37	37,100
October	667	612	625	1.24	1.43	38,400
November	922	616	696	1.38	1.54	41,400
December	2,004	602	908	1.79	2.06	55,800
The year	3,468	589	987	1.95	26.46	714,000

NOTE.—Estimates computed by the Geological Survey from daily discharge determined by the Great Western Power Co.

NORTH FORK OF FEATHER RIVER NEAR BIG BEND, CAL.

This station was established June 13, 1905, and is located about 300 feet above the head of Big Bend tunnel and about 20 miles north of Oroville.

No important tributaries enter for many miles above the station. West Branch enters from the west about 10 miles below the station by river, and Middle Fork comes in from the east about 20 miles below.

The datum of the staff gage remained unchanged from 1905 to 1907. During 1908 the gage was changed several times, owing to construction work about the head of Big Bend tunnel.

Discharge measurements are made by means of a boat when the stage is below 11 feet. For higher stages float measurements are made at this point and check measurements are made 2 miles downstream, from the cable of the Golden State Power Co.

The stream has a rock channel which is practically permanent. At low water the stream is about 85 feet wide and 19 feet deep and has a sluggish but uniform current.

Determinations of daily discharge are published as furnished by the Great Western Power Co., which has maintained this station since its establishment.

Daily discharge, in second-feet, of North Fork of Feather River near Big Bend, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,910	3,079	6,342	6,813	6,020	2,161	1,295	1,026	957	975	1,017	1,350
2	4,110	2,759	7,295	7,212	5,527	2,050	1,315	1,033	948	984	1,011	1,320
3	3,098	2,580	8,000	7,375	5,712	1,984	1,279	1,030	948	987	1,005	3,640
4	2,785	2,598	8,700	7,088	5,214	1,844	1,279	1,017	948	991	1,005	3,460
5	2,430	2,605	8,948	6,901	4,818	1,717	1,279	1,011	942	996	1,002	2,195
6	2,455	2,625	8,850	6,915	4,820	1,705	1,264	1,005	942	996	1,005	1,890
7	2,537	2,732	8,677	6,942	4,648	1,745	1,256	996	939	984	1,011	1,690
8	2,642	2,656	8,480	7,113	4,648	1,690	1,249	988	940	984	1,113	2,335
9	2,393	2,610	8,370	7,352	5,300	1,670	1,219	984	940	975	1,177	4,510
10	2,437	2,851	8,532	7,540	5,460	1,640	1,204	981	942	975	1,149	5,045
11	2,290	2,579	8,675	7,957	5,040	1,620	1,189	975	942	1,074	1,245	5,573
12	2,192	2,575	8,660	7,270	5,050	1,600	1,175	978	945	1,169	1,416	4,325
13	2,250	2,689	8,755	6,950	4,778	1,575	1,175	978	955	1,089	1,281	3,400
14	2,275	2,800	8,760	6,730	5,110	1,550	1,161	978	964	1,014	1,173	2,860
15	2,422	3,260	8,475	6,597	4,363	1,535	1,161	969	1,053	999	1,125	2,452
16	2,252	3,065	8,282	6,547	4,072	1,520	1,149	963	1,158	993	1,098	2,115
17	2,182	2,882	8,180	6,823	3,449	1,505	1,131	957	1,132	990	1,077	1,861
18	2,100	2,837	9,255	7,352	3,371	1,490	1,125	954	1,124	987	1,206	1,795
19	2,118	3,125	12,165	7,685	3,419	1,475	1,126	954	1,059	990	1,221	1,675
20	2,195	3,473	13,473	7,695	3,178	1,465	1,137	954	1,056	1,005	1,155	1,590
21	2,163	3,181	14,555	7,670	3,111	1,452	1,138	940	1,044	1,014	1,031	1,545
22	2,377	3,108	12,925	7,530	3,016	1,459	1,101	951	1,038	1,008	1,143	1,530
23	3,075	3,532	11,848	7,445	3,100	1,444	1,086	951	1,020	1,003	1,494	1,502
24	5,165	4,194	10,498	7,465	3,019	1,429	1,071	945	1,015	1,002	2,184	1,475
25	6,462	8,485	9,265	7,292	2,899	1,399	1,071	954	1,012	1,005	2,397	1,475
26	3,810	8,299	8,307	7,095	2,813	1,369	1,071	966	1,005	1,011	1,839	1,406
27	3,734	6,259	7,690	6,625	2,582	1,339	1,071	960	1,011	1,002	1,584	1,330
28	3,480	6,138	7,118	6,407	2,384	1,309	1,071	948	998	1,002	1,494	1,240
29	3,330	.....	6,730	5,815	2,435	1,309	1,054	943	978	1,005	1,407	1,225
30	3,090	.....	6,515	5,707	2,447	1,309	1,040	942	972	1,004	1,344	1,217
31	3,003	.....	6,555	.....	2,173	.....	1,035	947	.....	1,017	.....	1,320

NOTE.—Daily discharge determined by the Great Western Power Co.

Monthly discharge of North Fork of Feather River near Big Bend, Cal., for 1910.

[Drainage area, 1,940 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	6,462	2,100	2,990	1.54	1.78	184,000
February	8,485	2,575	3,560	1.84	1.92	198,000
March	14,555	6,342	9,000	4.64	5.35	553,000
April	7,957	5,707	7,060	3.64	4.06	420,000
May	6,020	2,173	4,000	2.06	2.38	246,000
June	2,161	1,309	1,580	.814	.91	94,000
July	1,315	1,035	1,160	.598	.69	71,300
August	1,033	940	973	.502	.58	59,800
September	1,158	939	998	.514	.57	59,400
October	1,169	975	1,010	.521	.60	62,100
November	2,397	1,002	1,280	.660	.74	76,200
December	5,573	1,217	2,240	1.15	1.33	138,000
The year	14,555	939	2,980	1.54	20.91	2,160,000

NOTE.—Estimates were computed by the Geological Survey from the daily discharge table furnished by the Great Western Power Co.

FEATHER RIVER AT OROVILLE, CAL.

This station, which is located near the Oroville highway bridge, in sec. 8, T. 19 N., R. 4 E., about 6 miles below the junction of North and Middle forks, and about 30 miles above the mouth of Yuba River, was originally established January 1, 1902. No important tributaries enter near the station.

No water is diverted immediately above the station, and all acquired water rights above are probably for power development. An irrigation project for lands in the vicinity of Biggs, Gridley, and Live Oak, is under construction. Water filings equal to the entire low-water flow have been made by the company interested in this reclamation. The point of diversion is a short distance below Oroville.

The United States Weather Bureau gage, located at the bridge, was read from 1902 to 1905. All gage heights for those years refer to a datum 2 feet lower than that used by the United States Weather Bureau in order to avoid minus readings. Discharge measurements were made from a boat about 500 feet above the bridge.

In December, 1905, the station was moved about 1,000 feet above the bridge, a staff gage was installed on the left bank, and a cable erected near the gage. The bridge gage was read from January 1 to February 28, 1906, and from September 5 to December 31; the cable gage from March 1 to July 24, 1906. No readings were made from July 25 to September 4, 1906. All gage heights for 1906 were reduced to the datum of the cable gage by means of a table of comparative readings on the two gages. The station was completely destroyed by the flood of March, 1907, which took away the gage

and the cable. From March 19 to April 7, 1907, the United States Weather Bureau gage on the bridge was read and the readings corrected to the datum of the cable gage.

On April 8, 1907, a new staff gage in several sections, referred to the old datum, was installed on the left bank, 1,000 feet above the highway bridge. A new cable was placed across the river October 10, 1907, about 125 feet below the old one and 20 feet below the new gage.

When the station on Feather River was established at the new location above the Oroville Bridge the section was thought to be fairly permanent, but measurements made during the last four years show changes in the gaging section, or in the stream channel below the gaging section, which have made it impossible to obtain a permanent rating curve. The construction of the Western Pacific Railway through the canyon of the Feather resulted in washing large amounts of heavy débris into the river channel. Undoubtedly this débris is constantly being brought down the river during periods of flood discharge.

There are many uncertainties in the past records on account of the washing out of gages, unreliable observers, and shifting channel.

Conditions for obtaining accurate measurements at high stages are poor. At other stages the discharge data are fairly reliable, though the channel is subject to change and frequent measurements are necessary. At low stage the stream is about 280 feet wide and 10 to 15 feet deep, and the current is sluggish. The records for 1910 may be considered good.

Discharge measurements of Feather River at Oroville, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 22	J. E. Stewart	287	3,190	6.87	5,260
Mar. 16	do	297	4,160	10.12	15,400
May 25	do	288	3,440	6.78	4,740
July 5	do	278	2,800	4.46	2,080
Aug. 5	do	266	2,490	3.52	1,150
Oct. 29	do	269	2,610	3.79	1,410
Dec. 16	do	283	3,120	5.66	3,500

Daily gage height, in feet, of Feather River at Oroville, Cal., for 1910.

[E. S. Blackmore, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.0	7.6	10.0	9.4	8.7	5.9	4.3	3.9	3.3	3.6	3.9	4.2
2	8.3	7.5	10.3	9.6	8.6	5.8	4.2	4.0	3.4	3.5	3.8	4.2
3	7.8	7.4	10.8	9.7	8.6	5.7	4.0	3.8	3.4	3.5	3.7	6.3
4	7.5	7.2	10.9	9.5	8.3	5.6	4.3	3.7	3.5	3.6	3.7	6.0
5	7.2	7.0	10.9	9.4	8.1	5.5	4.2	3.6	3.5	3.5	3.7	5.8
6	7.3	7.0	10.9	9.5	8.0	5.3	4.1	3.7	3.5	3.6	3.6	5.1
7	7.3	7.7	10.9	9.5	8.0	5.5	4.1	3.7	3.4	3.5	3.6	5.0
8	7.1	7.3	10.7	9.5	8.1	5.4	4.1	3.8	3.4	3.6	4.3	5.1
9	7.2	7.5	10.5	9.7	8.2	5.3	4.2	3.8	3.4	3.4	4.1	8.2
10	7.0	7.3	10.6	9.8	8.5	5.0	4.0	3.8	3.4	3.4	4.0	8.1

Daily gage height, in feet, of Feather River at Oroville, Cal., in 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	6.8	7.1	10.6	10.0	8.3	5.1	3.8	3.6	3.4	3.5	4.1	8.1
12	6.7	7.1	10.5	9.6	8.1	5.0	3.9	3.8	3.5	4.6	4.4	7.8
13	6.6	7.0	10.4	9.4	8.0	5.0	4.2	3.8	3.5	4.4	4.4	7.1
14	7.1	7.5	10.4	9.3	7.9	5.0	4.1	3.8	3.7	4.2	4.2	6.5
15	7.7	7.5	10.2	9.3	7.8	5.0	4.1	3.9	3.8	3.5	4.0	5.9
16	7.7	7.3	10.0	9.4	.....	4.9	4.0	3.7	3.7	3.8	3.5	5.5
17	7.0	7.2	10.1	9.5	7.6	4.9	4.2	3.6	3.6	3.8	3.9	5.2
18	6.8	7.2	10.4	9.5	7.5	4.8	4.1	3.6	3.6	3.5	4.5	5.1
19	6.7	8.1	12.3	9.7	7.4	4.8	4.0	3.7	3.6	3.3	4.2	5.0
20	6.7	7.7	12.5	9.7	7.3	4.8	4.0	3.8	3.6	3.45	4.1	4.8
21	6.5	7.5	12.7	9.6	7.2	4.8	3.9	3.8	3.5	3.55	4.0	4.9
22	6.9	8.1	12.4	9.5	7.2	4.7	3.9	3.9	3.5	3.3	4.1	4.7
23	7.6	8.3	11.9	9.5	7.0	4.6	3.8	3.8	3.5	3.5	4.0	4.6
24	10.0	9.5	11.1	9.5	6.9	4.6	3.9	3.8	3.5	3.4	5.4	4.5
25	8.5	11.3	10.5	9.5	6.7	4.3	3.9	3.8	3.5	3.2	6.5	4.5
26	8.5	10.2	10.1	9.5	6.6	4.4	3.9	3.7	3.6	3.6	5.4	4.4
27	8.1	9.5	9.9	9.3	6.5	4.5	3.9	3.8	3.6	3.6	4.9	4.3
28	7.9	9.5	9.5	9.2	6.4	4.5	3.8	3.7	3.5	3.3	4.5	4.3
29	7.7	.....	9.4	9.0	6.3	4.4	3.8	3.6	3.5	3.9	4.5	4.3
30	7.6	.....	9.2	8.9	6.1	4.3	3.8	3.4	3.5	3.9	4.3	4.2
31	7.5	.....	9.1	.....	6.0	.....	3.8	3.3	.....	3.9	.....	4.3

Daily discharge, in second-feet, of Feather River at Oroville, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10,800	6,780	14,700	12,300	9,830	3,730	1,880	1,500	1,010	1,240	1,500	1,780
2	8,620	6,550	16,000	13,100	9,510	3,600	1,780	1,590	1,080	1,160	1,400	1,780
3	7,280	6,320	18,400	13,500	9,510	3,470	1,590	1,400	1,080	1,160	1,320	4,300
4	6,550	5,890	19,000	12,700	8,620	3,340	1,880	1,320	1,160	1,240	1,320	3,860
5	5,890	5,490	19,000	12,300	8,060	3,220	1,780	1,240	1,160	1,160	1,320	3,600
6	6,100	5,490	19,000	12,700	7,800	2,980	1,680	1,320	1,160	1,240	1,240	2,740
7	6,100	7,020	19,000	12,700	7,800	3,220	1,680	1,320	1,080	1,160	1,240	2,620
8	5,690	6,100	18,000	12,700	8,060	3,100	1,680	1,400	1,080	1,240	1,880	2,740
9	5,890	6,550	17,000	13,500	8,340	2,980	1,780	1,400	1,080	1,080	1,680	8,340
10	5,490	6,100	17,400	13,900	9,200	2,620	1,590	1,400	1,080	1,080	1,590	8,060
11	5,120	5,690	17,400	14,700	8,620	2,740	1,400	1,240	1,080	1,160	1,680	8,060
12	4,940	5,690	17,000	13,100	8,060	2,620	1,500	1,400	1,160	2,180	1,980	7,280
13	4,770	5,490	16,500	12,300	7,800	2,620	1,780	1,400	1,160	1,980	1,980	5,690
14	5,690	6,550	16,500	11,900	7,540	2,620	1,680	1,400	1,320	1,780	1,780	4,610
15	7,020	6,550	15,600	11,900	7,280	2,620	1,680	1,500	1,400	1,160	1,590	3,730
16	7,020	6,100	14,700	12,300	7,020	2,510	1,590	1,320	1,320	1,400	1,160	3,220
17	5,490	5,890	15,200	12,700	6,780	2,510	1,780	1,240	1,240	1,400	1,500	2,860
18	5,120	5,890	16,500	12,700	6,550	2,400	1,680	1,240	1,240	1,160	2,080	2,740
19	4,940	8,060	26,600	13,500	6,320	2,400	1,590	1,320	1,240	1,010	1,780	2,620
20	4,940	7,020	27,900	13,500	6,100	2,400	1,590	1,400	1,240	1,120	1,680	2,400
21	4,610	6,550	29,200	13,100	5,890	2,400	1,500	1,400	1,160	1,200	1,590	2,510
22	5,300	8,060	27,200	12,700	5,890	2,290	1,500	1,500	1,160	1,010	1,680	2,290
23	6,780	8,620	24,300	12,700	5,490	2,180	1,400	1,400	1,160	1,160	1,590	2,180
24	14,700	12,700	20,000	12,700	5,300	2,180	1,500	1,400	1,160	1,080	3,100	2,080
25	9,200	21,000	17,000	12,700	4,940	1,880	1,500	1,400	1,160	940	4,610	2,080
26	9,200	15,600	15,200	12,700	4,770	1,980	1,500	1,320	1,240	1,240	3,100	1,980
27	8,660	12,700	14,300	11,900	4,610	2,080	1,500	1,400	1,240	1,240	2,510	1,880
28	7,540	12,700	12,700	11,600	4,450	2,080	1,400	1,320	1,160	1,010	2,080	1,880
29	7,020	.....	12,300	10,800	4,300	1,980	1,400	1,240	1,160	1,500	2,080	1,880
30	6,780	.....	11,600	10,500	4,000	1,880	1,400	1,080	1,160	1,500	1,880	1,780
31	6,550	.....	11,200	.....	3,860	.....	1,400	1,010	.....	1,500	.....	1,880

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Feather River at Oroville, Cal., for 1910.

[Drainage area, 3,640 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	14,700	4,610	6,750	1.85	2.13	415,000	A.
February	21,000	5,490	7,970	2.19	2.28	443,000	A.
March	29,200	11,200	17,900	4.92	5.67	1,100,000	A.
April	14,700	10,500	12,600	3.46	3.86	750,000	A.
May	9,830	3,860	6,850	1.88	2.17	421,000	A.
June	3,730	1,880	2,620	.720	.80	156,000	A.
July	1,880	1,400	1,600	.440	.51	98,400	A.
August	1,590	1,010	1,350	.371	.43	83,000	A.
September	1,400	1,010	1,170	.321	.36	69,600	A.
October	2,180	940	1,200	.330	.38	73,800	A.
November	4,610	1,160	1,860	.511	.57	111,000	A.
December	8,340	1,780	3,400	.934	1.08	209,000	A.
The year	29,200	940	5,440	1.49	20.24	3,930,000	

BUTT CREEK AT BUTTE VALLEY, CAL.

Butt Creek rises in the extreme western part of Plumas County and flows eastward, discharging into North Fork of Feather River about 9 miles south of Prattville. The creek is about 25 miles long, and its drainage area comprises 74 square miles. It has an approximate fall of 3,000 feet, and is well adapted for power development.

The gaging station was established June 14, 1905, about 2 miles above the mouth of the creek and 100 feet below the footbridge at the lower end of Butte Valley. The bottom of the channel is composed of coarse gravel and shifts somewhat during extreme floods.

Measurements are made by wading at low stages and from the footbridge at high water. The staff gage is nailed to a post 15 feet below the measuring section and its datum has remained unchanged.

The records are good, as the changes in channel have been well covered by measurements.

Determinations of daily discharge are published as furnished by the Great Western Power Co., which has maintained this station since its establishment.

Daily discharge, in second-feet, of Butt Creek at Butte Valley, Cal., for 1910.

Days.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	88	59	157	172	111	35	27.6	25.4	26.0	26.1	26	34
2	87	58	188	179	94	34.5	27.8	25.6	25.6	26.1	26	33
3	81	55	204	182	108	34	27.6	25.6	25.4	26.1	26	81
4	79	54	204	179	107	33.8	27.6	25.6	25.4	26.1	26	58
5	77	52	195	179	101	33	27.6	25.6	25.4	26.1	26	44
6	75	53	185	181	87	33	27.4	25.6	25.4	26.1	26	39
7	74	57	179	181	81	33	27.4	25.6	25.6	26.1	26	37
8	73	60	179	185	75	32.8	27.2	25.6	25.6	26.1	27	44
9	71	62	191	187	77	32.5	27.1	25.6	25.4	26.1	29	167
10	70	55	200	187	88	32.5	27.1	25.6	25.4	27	29	132

Daily discharge, in second-feet, of Butt Creek at Butte Valley, Cal., for 1910—Continued.

Days.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	70	57	200	232	76	32.3	26.5	26	25.4	27.8	32	140
12	63	61	204	187	74	32.3	26.5	26	25.6	28	35	94
13	64	62	220	178	71	32	26	26	26.0	28	29	52
14	64	65	232	170	66	31.7	26	26.5	26.0	27.2	28	65
15	63	65	210	161	61	31.2	26.5	26.5	26.1	26.1	28	42
16	66	68	191	167	58	30.8	26	26.5	28.6	26.1	29	41
17	66	69	211	169	55	30.4	25.6	26.5	28.5	26.1	30	40
18	66	64	255	173	52	30	25.6	26.5	27.4	26.2	32	39
19	62	60	417	173	50	29.3	25.6	27.1	27.1	26.2	29	37
20	58	60	475	176	49	29.3	25.6	27.1	27.1	26.2	30	37
21	58	62	334	172	48	29.3	25.4	27.1	26.5	26.2	30	37
22	57	71	365	162	47	28.9	25.4	26.5	26.5	26.2	31	36
23	53	61	272	155	44	28.9	25.4	27.1	26.5	26.1	32	36
24	49	94	212	148	46	28.5	25.4	27.1	26.0	26.1	67	36
25	49	204	206	134	45	28.5	25.4	27.1	26.0	26.1	85	34
26	51	132	180	124	41	28.1	25.4	26.5	26.5	26.1	65	33
27	55	108	165	120	41	28.1	25.4	26.5	27.1	26.1	47	33
28	58	112	153	117	41	28.1	25.4	26.5	26.5	26.1	46	32
29	62	.....	154	111	45	28.1	25.6	26.5	26.0	26.1	34	33
30	63	.....	158	119	38	27.8	25.4	26.5	25.6	26.2	34	34
31	60	.....	167	.....	37	.....	25.4	26.5	.....	26.2	.....	34

NOTE.—Determinations of daily discharge furnished by the Great Western Power Co.

Monthly discharge of Butt Creek at Butte Valley, Cal., for 1910.

[Drainage area, 73 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	88	49	65.5	0.898	1.04	4,030
February	204	52	72.9	.999	1.04	4,050
March	475	153	221	3.03	3.49	13,600
April	232	111	165	2.26	2.52	9,820
May	111	37	65.0	.890	1.03	4,000
June	35	27.8	30.9	.423	.47	1,840
July	27.8	25.4	26.3	.360	.42	1,620
August	27.1	25.4	26.3	.360	.42	1,620
September	28.6	25.4	26.2	.359	.40	1,560
October	28	26.1	26.4	.362	.42	1,620
November	85	26	34.7	.475	.53	2,060
December	167	32	52.7	.722	.83	3,240
The year	475	25.4	67.8	.929	12.59	49,100

NOTE.—These estimates were computed by the Geological Survey from the daily discharge table furnished by the Great Western Power Co.

MIDDLE FORK OF FEATHER RIVER AT CROMBERG, CAL.

This station, which is located in the N. ½ sec. 24, T. 23 N., R. 11 E. at the California White Pine Co.'s log chute, 600 feet west of the post office at Cromberg, about 4 miles below the mouth of Jamison Creek and half a mile above the mouth of Jackson Creek, was established November 3, 1910.

No water is diverted in the vicinity of the station.

The gage is a vertical staff fastened to a pier of the log chute near the right bank.

Discharge measurements are made by wading, as a car and cable have not yet been installed.

The drainage area above the station is well forested.

The station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

The following discharge measurement was made by F. G. Wood, 150 feet above log chute:

November 3, 1910: Width, 56 feet; area, 50 square feet; gage height, 2.45 feet; discharge, 54 second-feet.

Gage height of Middle Fork of Feather River at Cromberg, Cal., for 1910.

[J. E. Nail, observer.]

	Feet.		Feet.
Nov. 3	2.45	Dec. 3	3.8
22	2.75	9	4.0
26	3.45	19	2.9
29	2.9	30	2.8

MIDDLE FORK OF YUBA RIVER NEAR NORTH SAN JUAN, CAL.[1]

This station, which is located one-fourth mile below the highway bridge at Freeman's Crossing, 3 miles northeast of North San Juan, in the N. ½ NW. ¼ sec. 23, T. 18 N., R. 8 E., in the Tahoe National Forest, was established October 27, 1910.

Oregon Creek enters three-fourths mile above and Moonshine Creek one-fourth mile below the station. The North Fork joins the Middle Fork about 4 miles below Freeman's Crossing.

The gage is a vertical staff wedged between two large bowlders on the right bank, one-fourth mile below the bridge.

As a car and cable have not yet been installed, discharge measurements are made by wading or from the highway bridge.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Middle Fork of Yuba River near North San Juan, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 12[a]	T. W. Norcross	45	49	(b)	41
Oct. 27[c]	McGlashan and Wood	45	50	4.26	72
Dec. (d)	F. G. Wood	65	130	4.80	178

[a] Made by wading 300 feet above bridge.
[b] Gage not installed.
[c] Made by wading 125 feet above gage, 100 feet aboveriffle.
[d] Made by wading 150 feet above gage.

[1] This stream is locally known as Middle Yuba River.

Gage height of Middle Fork of Yuba River near North San Juan, Cal., for 1910.

[C. E. Whittum, observer.]

	Feet.		Feet.
Oct. 27	4.26	Dec. 5	5.00
28	4.26	10	4.95
Nov. 5	4.27	11	6.15
11	5.05	19	5.95
19	4.35	31	5.00

YUBA RIVER NEAR SMARTSVILLE, CAL.

This station, which is located 1 mile north of Smartsville and 20 miles above Marysville, Cal., at a point in the foothills called The Narrows, in sec. 22, T. 16 N., R. 6 E., was established June 2, 1903.

Deer Creek (draining about 89.6 square miles) enters from the east about 1 mile above the station. South Fork of Yuba (draining 360 square miles) and North Fork of Yuba (draining 492 square miles) enter from the east and north about 8 and 15 miles, respectively, above the station. Dry Creek (draining area 106 square miles) enters from the north about 7 miles below the station.

No water is diverted immediately above the station. Extensive water rights have been acquired throughout this basin, and practically the entire flow of the South Fork has been preempted by filings.

The Colgate power plant of the Pacific Gas & Electric Co., located about 12 miles above the station, diverts water from the North Fork of the Yuba about 1¼ miles below Bullards Bar. Water is also diverted from the South Fork of Yuba River to the Bear River Basin. The records at this station do not, therefore, show the natural run-off from the Yuba River Basin.

At the point of measurement the channel is straight for several hundred feet and is filled to a great depth with gravel and sand—tailings from hydraulic mining—which are continually shifting, alternately filling and scouring. On this account frequent discharge measurements are made in order to determine the discharge closely. The banks are high and rocky and confine the river at all stages. The current is swift. After the rains of 1904 it was found that the bed of the stream had been lowered for an average depth of 2 feet. During recent years the bed of the stream has been lowering, and on August 1, 1906, the gage datum was lowered 10 feet.

The gage is a vertical staff in two sections and is read daily. The low-water portion is bolted to a rock wall on the left bank; the high-water portion is bolted to the wall on the right bank at the cable from which discharge measurements are made.

The shifting of the bed and the torrential nature of the stream render conditions for obtaining accurate discharge data poor. At high stages only float velocities can be measured. The record for 1910 may be considered good.

Discharge measurements of Yuba River near Smartsville, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 17	J. R. McKeel	160	858	8.50	3,350
21	J. E. Stewart	153	702	8.00	2,600
27	J. R. McKeel	180	1,050	9.40	5,230
30	....do	170	932	8.60	4,300
Feb. 6	....do	165	796	8.00	3,140
13	....do	165	794	8.10	3,280
20	....do	170	910	8.50	4,190
27	....do	180	1,110	9.20	5,870
Mar. 8	....do	185	1,260	9.50	6,770
15	J. E. Stewart	195	1,150	9.55	6,530
May 2	J. R. McKeel	180	1,190	8.90	5,720
30	....do	160	850	7.40	2,960
June 5	....do	145	679	6.40	1,720
12	....do	135	583	5.90	1,210
July 17	....do	125	417	4.70	483
31	....do	123	389	4.50	381
Aug. 14	....do	122	360	4.30	317
28	....do	118	348	4.20	299
Sept. 4	....do	118	346	4.20	292
Oct. 23	....do	118	370	4.40	364
28[a]	J. E. Stewart	105	177	4.36	357
Nov. 5	J. R. McKeel	118	365	4.40	349
20	....do	125	426	4.80	527
Dec. 27	....do	125	445	5.00	645

[a] Measurement made by wading 200 feet below gage.

Daily gage height, in feet, of Yuba River near Smartsville, Cal., for 1910.

[J. R. McKeel, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.8	9.0	9.5	9.4	9.1	7.3	5.2	.....	4.2	4.4	4.4	4.9
2	11.5	8.4	9.7	9.9	8.9	7.0	5.2	4.5	.....	4.4	.....	4.8
3	10.4	8.3	10.0	9.75	8.9	6.9	5.1	.....	4.2	.....	.....	6.5
4	9.7	8.2	10.0	9.6	8.5	6.6	5.1	4.5	4.2	4.4	4.4	7.9
5	9.2	8.1	9.9	9.6	8.4	6.4	5.1	.....	.....	.....	4.4	6.6
6	8.9	8.0	9.7	9.6	8.4	6.3	.....	4.4	4.2	4.4	.....	5.9
7	8.8	9.0	9.5	9.6	8.3	6.3	.....	.....	.....	.....	4.4	5.7
8	8.7	8.4	9.5	9.8	9.1	6.2	5.0	4.4	4.2	4.4	4.5	5.6
9	8.7	8.2	9.6	10.2	9.5	6.1	.....	.....	.....	4.3	5.0	5.6
10	8.5	8.1	9.9	10.4	9.7	6.0	4.9	4.4	4.2	4.3	4.8	6.4
11	8.3	8.1	9.9	10.6	9.4	6.0	4.9	.....	.....	4.5	4.6	10.4
12	8.1	8.0	9.9	9.7	8.9	5.9	.....	4.3	4.2	5.1	5.8	7.4
13	8.0	8.1	9.9	9.8	9.0	5.9	4.8	.....	.....	4.9	5.2	6.5
14	8.9	8.3	10.0	9.7	9.0	5.8	4.8	4.3	4.2	4.7	4.9	6.2
15	9.8	8.1	9.6	9.5	.....	5.9	.....	.....	4.5	4.6	4.7	6.0
16	9.2	8.0	9.2	9.8	8.6	5.8	4.7	4.3	5.9	4.6	4.6	5.9
17	8.5	7.9	9.2	10.4	8.6	5.7	4.7	.....	5.1	4.6	4.6	5.8
18	8.3	8.0	10.2	10.7	8.5	5.6	.....	4.3	4.8	4.5	4.8	5.7
19	8.1	9.2	13.0	11.0	8.4	.....	4.7	.....	4.6	4.5	5.0	5.6
20	8.0	8.5	13.5	11.0	8.2	5.6	.....	4.3	4.5	4.5	4.8	5.5
21	8.0	8.3	12.9	10.7	8.1	5.6	4.7	.....	4.5	4.5	4.7	5.4
22	8.2	9.1	12.5	10.5	8.1	5.5	.....	4.2	.....	4.4	4.7	5.3
23	9.1	8.5	11.5	10.4	8.3	5.5	4.6	.....	4.5	4.4	4.7	5.2
24	13.9	8.9	10.8	10.45	8.3	5.5	.....	4.2	4.5	4.4	6.0	5.1
25	10.9	11.6	10.5	10.5	8.2	5.4	4.6	4.2	4.4	4.4	7.4	.....
26	.....	10.2	9.8	10.6	8.0	.....	.....	.....	.....	4.4	5.9	5.0
27	9.4	9.2	9.5	10.5	7.7	5.3	4.6	4.2	4.4	4.4	5.3	5.0
28	9.0	9.0	9.3	10.5	7.6	5.3	4.5	4.2	.....	4.4	5.2	5.0
29	8.8	.....	9.1	9.8	7.5	5.2	.....	.....	4.4	4.4	5.0	5.0
30	8.6	.....	9.0	9.4	7.4	5.2	4.5	4.2	.....	.....	4.9	5.0
31	8.5	.....	9.3	.....	7.4	.....	4.5	.....	.....	4.4	.....	4.9

Daily discharge, in second-feet, of Yuba River near Smartsville, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10,300	4,900	6,600	6,400	5,800	2,830	730	390	295	355	355	575
2	7,650	3,850	7,000	7,410	5,400	2,430	730	390	295	355	355	525
3	5,550	3,700	7,620	7,100	5,400	2,300	675	390	295	355	355	1,830
4	4,400	3,550	7,620	6,800	4,640	1,940	675	390	295	355	355	3,700
5	3,650	3,400	7,410	6,800	4,400	1,720	675	372	295	355	355	1,940
6	3,270	3,250	7,000	6,800	4,400	1,610	625	355	295	355	355	1,220
7	3,150	4,900	6,600	6,800	4,300	1,610	625	355	295	355	355	1,060
8	3,050	3,850	6,600	7,200	5,800	1,510	625	355	295	355	390	990
9	3,050	3,550	6,800	8,000	6,600	1,410	600	355	295	320	625	990
10	2,870	3,400	7,410	8,500	7,000	1,310	575	355	295	320	525	1,720
11	2,670	3,400	7,410	8,900	6,400	1,310	575	338	295	390	435	8,500
12	2,450	3,250	7,410	7,000	5,400	1,220	550	320	295	675	1,140	2,970
13	2,400	3,400	7,410	7,200	5,600	1,220	525	320	295	575	730	1,830
14	3,750	3,700	7,620	7,060	5,600	1,140	525	320	295	480	575	1,510
15	5,300	3,400	6,800	6,600	5,200	1,220	502	320	390	435	480	1,310
16	4,300	3,250	6,060	7,200	4,820	1,140	480	320	1,220	435	435	1,220
17	3,350	3,120	6,060	8,500	4,820	1,060	480	320	675	435	435	1,140
18	3,070	3,250	8,060	9,190	4,640	990	480	320	525	390	525	1,060
19	2,800	5,250	14,800	9,890	4,460	990	480	320	435	390	625	990
20	2,700	4,050	16,100	9,890	4,150	990	480	320	390	390	525	915
21	2,670	3,800	14,600	9,190	4,000	990	480	308	390	390	480	850
22	3,020	5,300	13,600	8,730	4,000	915	458	295	390	355	480	790
23	4,500	4,350	11,100	8,500	4,300	915	435	295	390	355	480	730
24	13,000	5,120	9,420	8,620	4,300	915	435	295	390	355	1,310	675
25	8,000	10,500	8,730	8,730	4,150	850	435	295	355	355	2,970	675
26	6,600	7,800	7,200	8,960	3,850	790	435	295	390	355	1,220	625
27	5,230	6,000	6,600	8,730	3,400	790	435	295	355	355	790	625
28	4,700	5,600	6,200	8,730	3,250	790	390	295	355	355	730	625
29	4,550	.....	5,800	7,200	3,110	730	390	295	355	355	625	625
30	4,200	.....	5,600	6,400	2,970	730	390	295	355	355	575	625
31	4,050	.....	6,200	.....	2,970	.....	390	295	.....	355	.....	575

NOTE.—Daily discharge Jan. 1 to Feb. 26 determined by the indirect method for shifting channels. Discharge for the remainder of the year determined from a rating curve well defined below 7,600 second feet. Discharge estimated or interpolated for days of missing gage heights.

Monthly discharge of Yuba River near Smartsville, Cal., for 1910.

[Drainage area, 1,220 square miles.]

Month.	Discharge in second-feet.			Per square mile.	Run off.		Accuracy.
	Maximum.	Minimum.	Mean.		Depth in inches on drainage area.	Total in acre-feet).	
January	13,000	2,400	4,520	3.70	4.27	278,000	B.
February	10,500	3,120	4,390	3.60	3.75	244,000	B.
March	16,100	5,600	8,170	6.70	7.72	502,000	B.
April	9,890	6,400	7,900	6.48	7.23	470,000	B.
May	7,000	2,970	4,690	3.84	4.43	288,000	A.
June	2,830	730	1,280	1.05	1.17	76,200	A.
July	730	390	525	.430	.50	32,300	A.
August	390	295	328	.269	.31	20,200	A.
September	1,220	295	383	.314	.35	22,800	A.
October	675	320	388	.318	.37	23,900	A.
November	2,970	355	653	.535	.60	38,900	A.
December	8,500	525	1,400	1.15	1.33	86,100	A.
The year	16,100	295	2,880	2.36	32.03	2,080,000	

NORTH FORK OF YUBA RIVER AT GOODYEAR BAR, CAL.[1]

This station, which is located at the highway bridge at Goodyear Bar, in the E. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., was established October 31, 1910.

[1] This stream is locally known as North Yuba River.

The first important tributary above the station is the North Fork of the North Fork at Downieville, 4 miles upstream. Rock Creek enters about one-eighth mile and Goodyear Creek about one-fourth mile below the station.

In the early days Goodyear Bar and Downieville were large placer-mining camps. At Downieville the entire low-water flow of the North Fork was diverted into a flume which extended along the side of the canyon for several miles. Each miner connected with this enterprise was allotted 30 feet of the river channel, which was carefully worked to bedrock. This section of the North Yuba was one of the richest placer districts in California. There is now considerable activity in quartz mining in this district.

The gage at this station is a vertical staff in two sections on the left bank: The low-water section is fastened to the old piling under the bridge, and the main gage is fastened to the left pier.

Discharge measurements are made from the bridge.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of North Fork of Yuba River at Goodyear Bar, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 14[a]	T. W. Norcross	72	100	[b]3.41	143
Oct. 31[c]	McGlashan and Wood	70	112	3.39	146
Dec. 8	F. G. Wood	71	157	3.85	330
Dec. 9	do	83	219	4.66	826

[a] Made by wading 300 feet above bridge.
[b] Water surface referenced and later gage height was determined.
[c] Made from downstream side of bridge.

Daily gage height, in feet, of North Fork of Yuba River at Goodyear Bar, Cal., for 1910.

[Walter S. Barton, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		3.4		11		3.5	5.3	21		3.6	3.85
2		3.4		12		3.5	4.5	22		3.6	3.8
3		3.4	5.2	13		3.5	4.0	23		4.2	3.8
4		3.4		14		3.5	4.0	24			3.8
5		3.4		15		3.5	3.9	25			3.75
6		3.45	3.8	16		3.5	3.9	26			3.7
7			3.8	17		3.55	3.9	27		3.6	3.7
8		3.48	4.0	18		3.55	3.9	28			3.75
9		3.55	4.6	19		3.6	3.85	29			3.7
10		3.5	4.7	20		3.6	3.85	30		3.4	3.7
								31	3.39		3.7

OREGON CREEK NEAR NORTH SAN JUAN, CAL.

This station, which is located 150 feet below the highway bridge, one-half mile from Freeman's Crossing, 3½ miles from North San Juan, in the N. ½ SE. ¼ sec. 28, T. 18 N., R. 8 E., in the Tahoe National Forest, was established October 28, 1910.

The gage is a vertical staff, fastened to an alder on the right bank, 150 feet below the bridge and about 500 feet above the mouth of the stream.

As a car and cable have not yet been installed the discharge measurements are made by wading or from the highway bridge.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Oregon Creek near North San Juan, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 28	McGlashan and Wood	36	20	3.73	8.4
Dec. 6	F. G. Wood	41	22	3.99	20
11	do	81	90	4.81	139

NOTE.—All measurements made by wading.

Gage height of Oregon Creek near North San Juan, Cal., for 1910.

[C. E. Whittum, observer.]

	Feet.
Oct. 28	3.73
Nov. 5	3.7
11	5.1
20	3.9
Dec. 5	4.1
19	5.1
31	4.1

NORTH FORK OF NORTH FORK OF YUBA RIVER AT DOWNIEVILLE, CAL.[1]

This station, which is located in the NE. ¼ NW. ¼ sec. 35, T. 20 N., R. 10 E., in the Tahoe National Forest, at upper highway bridge in Downieville, 500 feet above the dam and one-fourth mile above the mouth of the river, was established November 1, 1910.

The principal tributaries of this stream are Rattlesnake Creek, Middle Fork, and East Fork, all of which enter above the station.

A small ditch, which furnishes water for domestic uses at Downieville, heads above the station.

The gage is a vertical staff fastened to the left face of the right pier of the highway bridge.

[1] This stream is locally known as North Fork of North Yuba River.

Discharge measurements are made from this bridge also from the bridge near the mouth.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of North Fork of North Fork of Yuba River at Downieville, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 16[a]	T. W. Norcross	71	103	(b)	189
Nov. 1[c]	McGlashan and Wood	47	57	2.47	48
Dec. 9[a]	F. G. Wood	70	202	3.64	440

[a] Made from upstream side of lower bridge near mouth in Downieville.
[b] Water surface 20.52 feet below center of nail driven into top board on guard rail fence 48 feet from edge of right pier, upstream side of bridge.
[c] Made by wading about 800 feet above gage.

Daily gage height, in feet, of North Fork of North Fork of Yuba River at Downieville, Cal., for 1910.

[John T. Mason, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	2.67	2.70	11	2.89	3.80	21	2.60	2.90
2	2.67	2.70	12	2.98	3.40	22	2.60	2.90
3	2.70	3.75	13	2.75	3.20	23	3.50	2.85
4	2.70	3.25	14	2.65	3.15	24	3.00	2.85
5	2.65	3.05	15	2.65	3.05	25	3.10	2.85
6	2.67	3.00	16	2.68	3.05	26	3.00	2.83
7	2.67	3.00	17	2.60	3.05	27	2.80	2.80
8	2.80	3.35	18	2.87	3.03	28	2.70	2.80
9	2.74	3.62	19	2.73	3.00	29	2.70	2.80
10	2.70	3.55	20	2.69	2.99	30	2.70	2.80
						31		2.77

ROCK CREEK AT GOODYEAR BAR, CAL.

This station, which is located near the footbridge at Goodyear Bar, in the W. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., in the Tahoe National Forest, was established October 30, 1910.

The principal tributary is Woodruff Creek, which enters 350 feet above the station and about 600 feet above the mouth.

Three small ditches, having a total capacity of about 10 second-feet, head above the station. Two of these, Paul Bachel's ditch and William's ditch, divert water from Woodruff Creek about one-fourth mile above its junction with Rock Creek. The intake of the Kennedy ditch is about three-fourths mile above the mouth of Rock Creek. Paul Bachel's ditch, which supplies water for domestic use in the town of Goodyear Bar, carried 0.69 second-foot on October 31 and 0.96 second-foot on December 8, 1910.

The gage is a vertical staff fastened to an alder on the right bank.

Discharge measurements are made from the bridge 40 feet above the gage.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Rock Creek at Goodyear Bar, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 14	T. W. Noreross	5	2.0	(*a*)	0.6
Oct. 31	McGlashan and Wood	8	5.4	2.36	2.0
Dec. 8	F. G. Wood	7.5	6.6	2.48	4.9

a Reference point to water surface 9.96 feet. Reference point is chalked arrow on top of plank on footbridge, upstream side.

NOTE.—All measurements made by wading in the vicinity of the gage.

Daily gage height, in feet, of Rock Creek at Goodyear Bar, Cal., for 1910.

[Walter S. Barton, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	2.37	.....	11	.....	2.6	3.3	21	.....	2.6	2.65
2	.....	2.37	.....	12	.....	2.55	2.9	22	.....	2.6	2.6
3	.....	2.37	3.4	13	.....	2.55	2.9	23	.....	2.5	2.6
4	.....	2.4	.....	14	.....	2.55	2.8	24	.....	.....	2.6
5	.....	2.4	.....	15	.....	2.55	2.8	25	.....	.....	2.55
6	.....	2.4	2.5	16	.....	2.55	2.7	26	.....	.....	2.5
7	.....	2.4	2.5	17	.....	2.6	2.7	27	.....	2.4	2.5
8	.....	2.5	2.5	18	.....	2.6	2.7	28	.....	.....	2.5
9	.....	2.55	2.6	19	.....	2.6	2.65	29	.....	.....	2.5
10	.....	2.6	2.7	20	.....	2.6	2.65	30	2.37	2.3	2.5
								31	2.37	.....	2.5

GOODYEAR CREEK AT GOODYEAR BAR, CAL.

This station, which is located at the trail bridge, one-fourth mile north of the North Yuba bridge in the W. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., in the Tahoe National Forest, on October 30, 1910.

Although only about 300 feet above the mouth of the creek, the gage is believed to be above backwater from the North Yuba.

Three small ditches, having a total maximum capacity of about 7½ second-feet, head above the station. One of these, Andrew Bachel's ditch, diverts water from the main creek about 1 mile above the mouth. Of the others, the Morgan-Casserly ditch takes water from Eureka Creek 3½ miles above its mouth, and the Casserly ditch from Collins Ravine 2½ miles above its mouth.

The gage is a vertical staff, fastened to an alder on the left bank.

Discharge measurements are made from the bridge, 200 feet below the gage.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Goodyear Creek at Goodyear Bar, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq.ft.*	*Feet.*	*Sec.-ft.*
Oct. 31[a]	H. D. McGlashan	18	6.1	1.60	5.8
Dec. 8	F. G. Wood	24	19	1.75	14

[a] Measurement made by wading. Andrew Bachel's ditch dry.

Daily gage height, in feet, of Goodyear Creek at Goodyear Bar, Cal., for 1910.

[Walter S. Barton, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		1.6		11		1.65	2.5	21		1.65	1.85
2		1.6		12		1.65	2.1	22		1.65	1.9
3		1.6	3.2	13		1.65	2.1	23		1.9	1.85
4		1.6		14		1.65	2.0	24			1.8
5		1.6		15		1.6	2.0	25			1.8
6		1.6	1.8	16		1.6	1.9	26			1.75
7		1.6	1.8	17		1.6	1.9	27		1.7	1.75
8		1.65	1.8	18		1.6	1.9	28			1.7
9		1.7	1.9	19		1.65	1.9	29			1.7
10		1.7	2.0	20		1.65	1.85	30	1.6	1.6	1.7
								31	1.6		1.7

BEAR RIVER AT VAN TRENT, CAL.[1]

This station, which is located in the SE. ¼ sec. 21, T. 14 N., R. 6 E., about 800 feet below the bridge near the Dairy Farm mine, Van Trent post office, and 8 miles above Wheatland, was established October 8, 1904, to obtain data regarding the run-off from a deforested drainage basin.

No tributaries enter near the station. Wolf Creek, which enters from the north about 20 miles above, drains about 76 square miles. Rock Creek, a very small stream, enters about 1 mile below. Some water is stored on the headwaters of Bear River, and water is also diverted from the South Fork of Yuba River to this basin. Hence the records at this station do not show the natural run-off from the basin. During the low-water period nearly the entire flow is used for irrigation above the station.

[1] Formerly known as "above Wheatland." Van Trent is a new post office.

The staff gage, the datum of which has not been changed since the station was established, is in three sections on the left bank about 600 feet below the bridge.

In November, 1909, the car and cable were removed; since then measurements have been made by wading.

The rough channel and the torrential nature of the stream render conditions for obtaining accurate discharge data poor. The low-water portion of the 1909 curve has been slightly revised for 1910.

The following discharge measurement was made by J. E. Stewart by wading:

August 4, 1910: Width, 35 feet; area, 24 square feet; gage height, 0.96 foot; discharge, 26 second-feet.

Daily gage height, in feet, of Bear River at Van Trent, Cal., for 1910.

[Hermann Ernestus, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.9	4.2	3.6	2.9	2.0	1.3	1.0	0.9	0.8	0.9	1.0	1.1
2	5.5	3.4	3.5	2.8	2.0	1.3	1.0	.8	.8	.9	1.1	1.1
3	3.8	3.3	3.4	2.8	1.9	1.3	1.0	.9	.8	.9	1.1	1.2
4	3.5	3.2	3.4	2.7	2.0	1.3	1.0	.9	.8	.9	1.1	2.3
5	3.3	3.1	3.3	2.7	1.9	1.3	1.0	.9	.8	.9	1.1	1.5
6	3.2	3.0	3.3	2.6	1.9	1.3	1.0	.9	.8	.9	1.1	1.4
7	3.2	3.2	3.2	2.6	1.8	1.2	.9	.9	.8	.9	1.0	1.3
8	3.1	3.3	3.1	2.5	1.7	1.2	.9	.9	.8	.9	1.0	1.3
9	3.1	3.2	3.1	2.5	1.7	1.2	.9	.9	.8	.9	1.2	1.3
10	3.3	3.5	3.1	2.5	1.9	1.2	.9	.9	.8	.9	1.2	1.3
11	3.2	3.3	3.1	3.0	1.7	1.2	.9	.9	.8	.9	1.1	3.8
12	3.1	3.2	3.0	2.6	1.7	1.2	.9	.9	.8	1.4	1.1	2.1
13	3.0	3.1	3.0	2.5	1.6	1.2	.9	.9	.8	1.4	1.1	1.7
14	4.1	3.2	3.0	2.4	1.6	1.2	.9	.9	.8	1.2	1.1	1.6
15	5.2	3.2	3.0	2.4	1.5	1.2	.9	.9	.9	1.1	1.1	1.5
16	4.7	3.1	2.9	2.3	1.6	1.1	.9	.8	1.35	1.1	1.1	1.4
17	4.1	3.0	2.9	2.3	1.5	1.1	.9	.9	1.2	1.1	1.1	1.4
18	3.6	2.9	2.9	2.3	1.4	1.1	.9	.9	1.0	1.1	1.1	1.4
19	3.4	5.3	3.3	2.2	1.4	1.1	.9	.9	.9	1.1	1.3	1.3
20	3.2	4.1	4.8	2.2	1.4	1.1	.9	.9	.9	1.1	1.2	1.3
21	3.1	3.6	7.0	2.1	1.4	1.1	.9	.9	.9	1.1	1.1	1.3
22	3.2	3.4	5.3	2.1	1.5	1.1	.9	.9	.9	1.1	1.1	1.3
23	3.6	4.0	7.1	2.1	1.4	1.1	.9	.8	.9	1.1	1.1	1.3
24	7.45	3.7	4.9	2.0	1.4	1.1	.9	.9	.9	1.0	1.1	1.3
25	5.2	5.1	4.1	1.9	1.3	1.1	.9	.9	.9	1.0	1.2	1.3
26	4.4	4.3	3.7	1.9	1.5	1.0	.9	.8	.9	1.0	1.5	1.2
27	4.1	3.9	3.4	1.9	1.3	1.0	.9	.8	.9	1.0	1.2	1.2
28	3.8	3.7	3.3	2.35	1.3	1.0	.8	.8	.9	1.0	1.2	1.2
29	3.6	.....	3.1	2.2	1.3	1.0	.9	.8	.9	1.0	1.2	1.2
30	3.5	.....	3.0	2.0	1.3	1.0	.9	.8	.9	1.0	1.1	1.2
31	3.4	.....	2.9	.....	1.3	.....	.9	.8	.....	1.0	.....	1.2

Daily discharge, in second-feet, of Bear River at Van Trent, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,670	971	709	452	201	66	32	23	16	23	32	42
2	1,660	632	670	420	201	66	32	16	16	23	42	42
3	791	594	632	420	178	66	32	23	16	23	42	53
4	670	557	632	390	201	66	32	23	16	23	42	276
5	594	521	594	390	178	66	32	23	16	23	42	97
6	557	486	594	361	178	66	32	23	16	23	42	81
7	557	557	557	361	156	53	23	23	16	23	32	66
8	521	594	521	332	135	53	23	23	16	23	32	66
9	521	557	521	332	135	53	23	23	16	23	53	66
10	594	670	521	332	178	53	23	23	16	23	53	66
11	557	594	521	486	135	53	23	23	16	23	42	791
12	521	557	486	361	135	53	23	23	16	81	42	225
13	486	521	486	332	115	53	23	23	16	81	42	135
14	925	557	486	303	115	53	23	23	16	53	42	115
15	1,480	557	486	303	97	53	23	23	23	42	42	97
16	1,210	521	452	276	115	42	23	16	74	42	42	81
17	925	486	452	276	97	42	23	23	53	42	42	81
18	709	452	452	276	81	42	23	23	32	42	42	81
19	632	1,540	594	250	81	42	23	23	23	42	66	66
20	557	925	1,260	250	81	42	23	23	23	42	53	66
21	521	709	2,750	225	81	42	23	23	23	42	42	66
22	557	632	1,540	225	97	42	23	23	23	42	42	66
23	709	880	2,830	225	81	42	23	16	23	42	42	66
24	3,140	749	1,320	201	81	42	23	23	23	32	42	66
25	1,480	1,430	925	178	66	42	23	23	23	32	53	66
26	1,060	1,020	749	178	97	32	23	16	23	32	97	53
27	925	835	632	178	66	32	23	16	23	32	53	53
28	791	749	594	290	66	32	16	16	23	32	53	53
29	709	.....	521	250	66	32	23	16	23	32	53	53
30	670	.....	486	201	66	32	23	16	23	32	42	53
31	632	.....	452	.....	66	.....	23	16	.....	32	.....	53

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined.

Monthly discharge of Bear River at Van Trent, Cal., for 1910.

[Drainage area, 263 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	3,140	521	914	3.48	4.01	56,200	C.
February	1,540	452	709	2.70	2.81	39,400	C.
March	2,830	452	788	3.00	3.46	48,500	C.
April	486	178	302	1.15	1.28	18,000	C.
May	201	66	117	.445	.51	7,190	B.
June	66	32	48.4	.184	.21	2,880	B.
July	32	16	24.5	.093	.11	1,510	B.
August	23	16	21.0	.080	.09	1,290	B.
September	74	16	22.7	.086	.10	1,350	B.
October	81	23	35.5	.135	.16	2,180	B.
November	97	32	46.2	.176	.20	2,750	B.
December	791	42	105	.399	.46	6,460	B.
The year	3,140	16	259	.985	13.40	188,000	

AMERICAN RIVER BASIN.

AMERICAN RIVER NEAR FAIROAKS, CAL.

American River drains an area comprising about 2,000 square miles lying on the western slope of the Sierra, south of Bear and Yuba River basins, west of Lake Tahoe and the Truckee River basin, and north of the Cosumnes and Mokelumne River basins.

The river is formed by the union of three principal forks, which rise in the high Sierra at an altitude of 9,000 to 10,000 feet. North and Middle forks drain areas of 349 and 640 square miles, respectively. Each is about 60 miles long and has a total fall of nearly 8,000 feet. South Fork is also 60 miles long, falls nearly 9,000 feet, and drains an area comprising 861 square miles. North and Middle forks unite near Auburn, about 20 miles above the mouth of South Fork, which is only a few miles above Folsom. Each of the forks has many other forks, branches and tributaries. The river flows southwestward to its junction with the Sacramento.

The gaging station, which is located in the San Juan land grant at the Fairoaks highway bridge, about 1,000 feet north of the railroad station, was established November 3, 1904.

No important tributaries enter American River above or below Fairoaks, except the South Fork, which joins the main stream about 3 miles above Folsom and about 10 miles above the station.

The discharge from the South Fork of American River is affected by storage from Silver Lake and Echo Lake and by water diverted from the North Fork of Cosumnes River basin. The natural outlet of Echo Lake is into the Lake Tahoe drainage basin. By a court decree, the Sierra Water Supply Co. has secured permission to turn the water into the American River basin.

Water is diverted also above Placerville just below the mouth of Silver Fork for irrigation, mining, power, and municipal supply.

The position of the gage has been changed several times during the continuance of the station, but no change has been made in the datum. The present gage is located on the right bank at the highway bridge. A low-water staff gage is fastened to a pile 10 feet below the concrete pier on which the upper section of the gage is painted.

The old bridge was destroyed by flood in March, 1907, after which time measurements were made from a temporary bridge until the end of 1908. This temporary bridge was washed out January 13, 1909. A new steel bridge was completed early in 1909, and measurements are now made from it except at low water, when wading measurements can be made.

The current is sluggish at low water and swift at medium and high stages. During floods the river overflows the left bank for several

hundred feet, but all the water passes under the bridge. On account of this increase in the width of the stream the mean velocity tends to decrease at extreme high water and hence fairly good flood measurements may be made.

The rating curve for 1910 is well defined and the estimates may be considered excellent.

Discharge measurements of American River near Fairoaks, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 17	J. E. Stewart	353	1,920	5.58	6,020
Mar. 10	do	358	2,330	6.65	8,660
24	do	363	2,820	8.60	15,000
May 23	do	353	1,750	5.60	6,010
July 1	do	307	741	2.70	898
12	do	283	657	2.35	572
Aug. 7[a]	W. V. Hardy	170	119	1.71	184
Oct. 25[a]	J. E. Stewart	125	154	2.01	332

[a] Measurement made by wading.

Daily gage height, in feet, of American River near Fairoaks, Cal., for 1910.

[M. J. Ferry, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.8	5.3	6.4	6.7	6.8	5.5	2.5	2.0	1.7	1.8	2.2	2.5
2	9.7	5.2	6.2	6.9	6.7	5.3	2.5	2.0	1.7	1.9	2.2	2.5
3	8.7	5.3	6.4	6.8	6.5	5.2	2.6	1.9	1.7	1.9	2.3	2.5
4	8.3	5.4	6.6	6.8	6.4	5.0	2.6	1.8	1.7	1.9	2.3	2.9
5	7.9	6.3	6.6	6.7	6.2	4.8	2.5	1.8	1.7	2.0	2.3	5.0
6	7.5	6.2	6.5	6.7	6.0	4.6	2.4	1.8	1.7	2.1	2.2	5.1
7	7.3	5.4	6.5	6.8	6.0	4.3	2.2	1.8	1.7	2.0	2.2	4.5
8	6.9	5.2	6.4	7.0	6.1	4.2	2.3	1.7	1.8	2.1	2.3	4.0
9	5.9	5.0	6.6	7.4	6.2	3.9	2.2	1.7	1.8	2.0	2.3	3.8
10	5.3	4.8	6.6	7.7	6.4	3.7	2.3	1.8	1.7	1.9	2.3	3.2
11	4.8	4.7	6.8	7.9	6.5	3.6	2.3	1.8	1.7	1.9	2.2	3.4
12	4.6	4.6	6.7	6.9	6.6	3.6	2.2	1.7	1.7	1.9	2.2	3.7
13	4.5	4.5	6.8	6.7	6.6	3.6	2.3	1.7	1.8	2.0	2.2	3.6
14	4.4	4.5	6.9	6.9	6.7	3.5	2.3	1.7	1.7	1.9	2.2	3.5
15	4.9	4.6	6.6	7.2	6.7	3.5	2.3	1.8	1.7	2.0	2.3	3.4
16	5.9	4.7	6.4	7.4	6.8	3.5	2.2	1.8	1.8	2.1	2.3	3.4
17	6.5	4.6	6.1	7.5	6.8	3.4	2.3	1.8	1.7	2.1	2.3	3.3
18	5.3	5.6	6.8	7.6	6.8	3.3	2.3	1.7	1.7	2.1	2.3	3.2
19	4.8	5.5	9.1	7.7	6.8	3.2	2.2	1.7	1.7	2.2	2.3	3.2
20	5.4	5.4	10.3	7.7	6.7	3.2	2.2	1.8	1.7	2.1	2.4	3.1
21	5.8	5.1	10.1	7.9	6.6	3.1	2.2	1.7	1.7	2.0	2.4	3.1
22	6.3	5.1	9.7	7.8	6.7	3.1	2.2	1.7	1.7	2.0	2.4	3.0
23	8.1	5.2	9.3	7.7	6.7	3.0	2.3	1.8	1.8	2.0	2.4	2.9
24	9.5	5.3	8.5	7.7	6.5	3.0	2.3	1.7	1.8	1.9	2.4	2.8
25	6.5	5.6	7.3	7.6	6.2	2.8	2.2	1.8	1.8	1.9	2.4	2.7
26	6.3	5.6	7.1	7.8	6.1	2.7	2.2	1.7	1.8	2.0	2.4	2.6
27	5.8	5.7	6.9	7.7	6.0	2.6	2.3	1.8	1.8	2.1	2.4	2.5
28	5.5	6.6	6.8	7.3	5.8	2.6	2.1	1.7	1.8	2.1	2.4	2.5
29	5.5	.....	6.6	7.0	5.7	2.5	2.1	1.7	1.9	2.2	2.4	2.4
30	5.6	.....	6.5	6.8	5.6	2.5	2.0	1.7	1.9	2.2	2.5	2.4
31	5.5	.....	6.7	.....	5.6	.....	2.0	1.8	.....	2.2	.....	2.3

Daily discharge, in second-feet, of American River near Fairoaks, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	19,600	5,320	7,950	8,780	9,060	5,780	690	330	180	225	455	690
2	19,200	5,100	7,450	9,340	8,780	5,320	690	330	180	275	455	690
3	15,300	5,320	7,950	9,060	8,220	5,100	780	275	180	275	525	690
4	13,800	5,550	8,500	9,060	7,950	4,660	780	225	180	275	525	1,100
5	12,400	7,700	8,500	8,780	7,450	4,220	690	225	180	330	525	4,660
6	11,100	7,450	8,220	8,780	6,970	3,800	605	225	180	390	455	4,880
7	10,500	5,550	8,220	9,060	6,970	3,220	455	225	180	330	455	3,600
8	9,340	5,100	7,950	9,620	7,210	3,040	525	180	225	390	525	2,690
9	6,730	4,660	8,500	10,800	7,450	2,520	455	180	225	330	525	2,360
10	5,320	4,220	8,500	11,800	7,950	2,200	528	225	180	275	525	1,460
11	4,220	4,000	9,060	12,400	8,220	2,050	525	225	180	275	455	1,750
12	3,800	3,800	8,780	9,340	8,500	2,050	455	180	180	275	455	2,200
13	3,600	3,600	9,060	8,780	8,500	2,050	525	180	225	330	455	2,050
14	3,410	3,600	9,340	9,340	8,780	1,900	525	180	180	275	455	1,900
15	4,440	3,800	8,500	10,200	8,780	1,900	525	225	180	330	525	1,750
16	6,730	4,000	7,950	10,800	9,060	1,900	485	225	225	390	525	1,750
17	8,220	3,800	7,210	11,100	9,060	1,750	525	225	180	390	525	1,600
18	5,320	6,010	9,060	11,500	9,060	1,600	525	180	180	390	525	1,460
19	4,220	5,780	16,800	11,800	9,060	1,460	455	180	180	455	525	1,460
20	5,550	5,550	21,700	11,800	8,780	1,460	455	225	180	390	605	1,340
21	6,490	4,880	20,800	12,400	8,500	1,340	455	180	180	330	605	1,340
22	7,700	4,880	19,200	12,100	8,780	1,340	455	180	180	330	605	1,220
23	13,100	5,100	17,600	11,800	8,780	1,220	525	225	225	330	605	1,100
24	18,400	5,320	14,500	11,800	8,220	1,220	525	180	225	275	605	985
25	8,220	6,010	10,500	11,500	7,450	985	455	225	225	275	605	875
26	7,700	6,010	9,920	12,100	7,210	875	455	180	225	330	605	780
27	6,490	6,250	9,340	11,800	6,970	780	525	225	225	390	605	690
28	5,780	8,500	9,060	10,500	6,490	780	390	180	225	390	605	690
29	5,780	.....	8,500	9,620	6,250	690	390	180	275	455	605	605
30	6,010	.....	8,220	9,060	6,010	690	330	180	275	455	690	605
31	5,780	.....	8,780	.....	6,010	.....	330	225	.....	455	.....	525

NOTE.—Daily discharges determined from a well-defined discharge rating curve.

Monthly discharge of American River near Fairoaks, Cal., for 1910

[Drainage area, 1,910 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	19,600	3,410	8,520	4.46	5.14	524,000	A.
February	8,500	3,600	5,240	2.74	2.85	291,000	A.
March	21,700	7,210	10,500	5.50	6.34	646,000	A.
April	12,400	8,780	10,500	5.50	6.14	625,000	A.
May	9,060	6,010	7,950	4.16	4.80	489,000	A.
June	5,780	690	2,260	1.18	1.32	134,000	A.
July	780	330	516	.270	.31	31,700	A.
August	330	180	213	.112	.13	13,100	A.
September	275	180	201	.105	.12	12,000	A.
October	455	225	342	.179	.21	21,000	A.
November	690	455	538	.282	.31	32,000	A.
December	4,880	525	1,600	.838	.97	98,400	A.
The year	21,700	180	4,030	2.11	28.64	2,920,000	

CACHE CREEK BASIN.

GENERAL FEATURES.

The Cache Creek, the only known outlet of Clear Lake, drains an area comprising 1,290 square miles, lying on the eastern slope of the Coast Range in Lake, Colusa, and Yolo Counties, immediately south

and west of the south end of the Stony Creek basin and north of the Putah Creek basin.

From the lake Cache Creek flows southeastward to Yolo basin and ultimately discharges into Sacramento River through sloughs. Its total length is about 80 miles.

The largest and most important tributary of Cache Creek is the North Fork, which drains 250 square miles in the eastern part of Lake County. The only other tributary of much importance is Bear Creek, which drains the western part of Colusa County. These creeks are very small in the summer, but rarely become dry. All the tributaries are torrential.

CACHE CREEK AT LOWER LAKE, CAL.

This station was established January 1, 1901, to determine the outflow of Clear Lake. The gage and measuring section were originally located at the wagon bridge just below the outlet of Clear Lake, about 1 mile from Lower Lake, Cal., and below Siegler Creek. On March 26, 1903, a cable was installed 300 feet above the bridge and above Siegler Creek, and a new staff gage was set 100 feet above the cable on the left bank in the SE. ¼ SE. ¼ sec. 34, T. 13 N., R. 7 W. On March 26, when this gage was set, the reading was 5.7 feet, the old gage reading being 4.4 feet. The gage is read daily. The gage datum has remained unchanged.

No tributaries enter above the station except those which come into Clear Lake. Siegler Creek enters about 300 feet below the station. North Fork joins the main creek about 14 miles below the lake.

The flow at the station is regulated by Clear Lake, which diminishes the intensity of floods and prolongs the summer flow.

Conditions at this station are peculiar. The stream bed at this point forms a gravel bank which controls the outlet of Clear Lake. The grade of the creek down to Siegler Creek is small. When Cache Creek is low and Siegler Creek high, the current of Cache Creek is reversed, and part of the water from Siegler Creek finds its way upstream into Clear Lake, the rest flowing downstream into Cache Creek. This phenomenon happens at extreme flood stages and causes backwater at the gage above the cable. The flow from Siegler Creek is very small, except at these flood periods, which are usually of short duration.

No discharge measurements were made during 1910. As the channel is firm gravel, it is practically permanent and the records are considered good.

Daily gage height, in feet, of Cache Creek at Lower Lake, Cal., for 1910.

[J. R. Anderson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	4.7	5.05	5.45	4.85	4.15	3.6	3.05	2.5	2.2	1.9	1.85
2	3.6	4.6	5.05	5.45	4.85	4.15	3.55	3.05	2.5	2.15	1.9	1.9
3	3.55	4.5	5.05	5.4	4.8	4.15	3.55	3.05	2.5	2.15	1.9	1.9
4	3.55	4.6	5.1	5.4	4.8	4.15	3.5	3.0	2.5	2.1	1.9	1.95
5	3.55	4.6	5.1	5.4	4.75	4.1	3.45	3.0	2.5	2.1	1.9	1.95
6	3.6	4.55	5.05	5.4	4.75	4.05	3.45	3.0	2.5	2.05	1.9	1.9
7	3.6	4.6	5.1	5.35	4.75	4.0	3.45	3.0	2.45	2.05	1.9	1.9
8	3.55	4.7	5.05	5.35	4.75	4.0	3.4	2.95	2.45	2.1	1.9	1.9
9	3.5	4.75	5.05	5.3	4.7	4.0	3.4	2.95	2.45	2.05	1.9	1.9
10	3.55	4.75	5.0	5.2	4.7	3.95	3.4	2.95	2.4	2.1	1.9	1.9
11	3.55	4.8	5.0	5.25	4.65	3.95	3.4	2.95	2.4	1.9	1.9	1.95
12	3.55	4.8	5.0	5.35	4.65	4.0	3.35	2.9	2.35	1.95	1.95	1.95
13	3.35	4.8	4.95	5.3	4.65	4.0	3.35	2.9	2.3	2.05	1.9	1.95
14	3.6	4.85	5.0	5.25	4.6	3.9	3.3	2.9	2.25	2.05	1.95	1.95
15	3.8	4.8	4.95	5.25	4.55	3.9	3.3	2.9	2.35	2.05	1.85	2.0
16	3.8	4.8	4.95	5.2	4.5	3.85	3.3	2.85	2.3	2.05	1.85	2.0
17	3.85	4.8	4.95	5.2	4.5	3.85	3.25	2.85	2.25	2.0	1.85	1.95
18	3.85	4.8	4.95	5.2	4.5	3.85	3.25	2.8	2.2	2.0	1.9	1.9
19	3.85	4.8	4.95	5.15	4.5	3.8	3.25	2.8	2.25	1.95	1.9	1.9
20	3.9	4.8	5.0	5.15	4.4	3.8	3.2	2.8	2.25	1.95	1.85	1.9
21	3.9	4.8	5.05	5.1	4.4	3.8	3.2	2.8	2.2	2.0	1.8	1.95
22	3.95	4.9	5.3	5.1	4.4	3.75	3.2	2.8	2.2	2.0	1.85	1.9
23	4.0	4.85	5.25	5.05	4.35	3.75	3.15	2.75	2.2	1.95	1.8	1.9
24	4.35	4.85	5.25	5.0	4.35	3.7	3.15	2.75	2.2	1.95	1.8	1.9
25	4.3	4.9	5.25	5.05	4.3	3.7	3.15	2.75	2.2	1.95	1.95	1.9
26	4.4	4.9	5.2	5.0	4.3	3.65	3.1	2.75	2.2	1.95	1.85	1.9
27	4.5	5.0	5.65	4.95	4.3	3.7	3.1	2.7	2 15	1.95	1.8	1.9
28	4.55	5.05	5.4	4.95	4.25	3.65	3.1	2.65	2.15	1.95	1.85	1.9
29	4.6	.....	5.4	4.95	4.25	3.6	3.1	2.6	2.15	1.95	1.85	1.85
30	4.6	.....	5.4	4.9	4.25	3.6	3.1	2.55	2.15	1.95	1.85	1.9
31	4.6	.....	5.4	.....	4.2	.....	3.1	2.5	.....	1.95	.....	1.9

Daily discharge, in second-feet, of Cache Creek at Lower Lake, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	202	444	534	645	482	314	202	104	37	12	5	4.5
2	202	419	534	645	482	314	192	104	37	10	5	5
3	192	395	534	631	469	314	192	104	37	10	5	5
4	192	419	547	631	469	314	183	97	37	8	5	5.5
5	192	419	547	631	456	303	174	97	37	8	5	5.5
6	202	407	534	631	456	292	174	97	37	7	5	5
7	202	419	547	617	456	282	174	97	32	7	5	5
8	192	444	534	617	456	282	164	90	32	8	5	5
9	183	456	534	603	444	282	164	90	32	7	5	5
10	192	456	520	575	444	272	164	90	27	8	5	5
11	192	469	520	589	431	272	164	90	27	5	5	5.5
12	192	469	520	617	431	282	154	84	22	5.5	5.5	5.5
13	154	469	507	603	431	282	154	84	18	7	5	5.5
14	202	482	520	589	419	262	145	84	15	7	5.5	5.5
15	242	469	507	589	407	262	145	84	22	7	4.5	6
16	242	469	507	575	395	252	145	77	18	7	4.5	6
17	252	469	507	575	395	252	136	77	15	6	4.5	5.5
18	252	469	507	575	395	252	136	71	12	6	5	5
19	252	469	507	561	395	242	136	71	15	5.5	5	5
20	262	469	520	561	371	242	128	71	15	5.5	4.5	5
21	262	469	534	547	371	242	128	71	12	6	4	5.5
22	272	494	603	547	371	232	128	71	12	6	4.5	5
23	282	482	589	534	360	232	120	65	12	5.5	4.0	5
24	360	482	589	520	360	222	120	65	12	5.5	4.0	5
25	348	494	589	534	348	222	120	65	12	5.5	5.5	5
26	371	494	575	520	348	212	112	65	12	5.5	4.5	5
27	395	520	705	507	348	222	112	59	10	5.5	4.0	5
28	407	534	631	507	336	212	112	54	10	5.5	4.5	5
29	419	.....	631	507	336	202	112	48	10	5.5	4.5	4.5
30	419	.....	631	494	336	202	112	42	10	5.5	4.5	5
31	419	.....	631	.....	325	.....	112	37	.....	5.5	.....	5

NOTE.—Daily discharge determined from a rating curve fairly well defined and based on measurements made previous to 1910.

Monthly discharge of Cache Creek at Lower Lake, Cal., for 1910.

[Drainage area, 500 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	419	154	263	0.526	0.61	16,200	A.
February	534	395	462	.924	.96	25,700	A.
March	705	507	555	1.11	1.28	34,100	A.
April	645	494	576	1.15	1.28	34,300	A.
May	482	325	404	.808	.93	24,800	A.
June	314	202	259	.518	.58	15,400	A.
July	202	112	146	.292	.34	8,980	B.
August	104	37	77.6	.155	.18	4,770	B.
September	37	10	21.2	.042	.05	1,260	C.
October	12	5	6.71	.013	.02	413	C.
November	5.5	4	4.77	.0095	.01	284	C.
December	6	4.5	5.16	.010	.01	317	C.
The year	705	4	230	.460	6.25	167,000	

CACHE CREEK NEAR YOLO, CAL.

This station was established January 1, 1903, on the Río Jesús María land grant, at the old wagon bridge on the road from Woodland to Yolo, about three-fourths mile from Yolo, and about 1,000 feet above the railroad bridge. In the fall of 1904 a new bridge was constructed, and the gage record was interrupted from September 11 to October 1, 1904.

No important tributaries enter within 12 or 15 miles of the station.

Many ditches take water from Cache Creek above the station for use in irrigation around Yolo and Woodland. The irrigating ditches usually take all the late summer flow. All available water in this basin has been filed upon and all lands embraced within storage reservoirs are held in private ownership.

The original staff gage was nailed to the upstream side of the right abutment of the old wagon bridge and was read twice each day. On October 2, 1904, a new staff gage was installed. It is in four sections, three of which are above the bridge and the fourth is bolted to the face of the concrete abutment on the right bank. The datum of the gage has been unchanged during the life of the station.

Discharge measurements have been made from the downstream side of the bridge.

Considered as a whole the records from January 1, 1903, to December, 1910, are good. The bed of the stream is composed of earth and gravel and is subject to some change. The banks are steep and well wooded, and their height has been increased by levees which are overtopped at extremely high water. The current is swift at moderate and high stages. The creek is dry at the station almost every summer or fall.

Discharge measurements of Cache Creek near Yolo, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 29	J. E. Stewart	90	271	3.88	1,020
Mar. 8	do	93	227	3.31	794
22	do	106	693	7.84	3,910
May 26	do	86	90	1.88	185
July 9[a]	do	4.6	1.2	.65	1.1

[a] Measurement made by wading.

Daily gage height, in feet, of Cache Creek near Yolo, Cal., for 1910.

[Mrs. C. W. Bigelow, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	2.1	3.5	3.8	3.8	2.7	1.6	0.8
2	2.05	3.4	3.7	3.75	2.7	1.5	.75
3	2.05	3.3	3.6	3.7	2.7	1.45	.75
4	2.0	3.3	3.55	3.7	2.65	1.4	.75
5	2.0	3.25	3.5	3.6	2.6	1.35	.75
6	1.95	3.2	3.45	3.5	2.55	1.3	.75
7	1.95	3.9	3.4	3.5	2.55	1.25	.7
8	1.95	4.1	3.3	3.45	2.5	1.25	.7
9	1.95	3.6	3.25	3.4	2.45	1.2	.7
10	1.95	4.1	3.2	3.35	2.45	1.2	.7
11	1.95	3.9	3.15	3.35	2.4	1.2	.7
12	1.9	3.7	3.15	3.45	2.35	1.15	.....
13	1.9	3.6	3.15	3.4	2.35	1.15	.....
14	2.35	3.55	3.1	3.35	2.3	1.15	.....
15	3.45	3.5	3.1	3.3	2.25	1.15	.....
16	4.3	3.45	3.05	3.25	2.25	1.15	.....
17	3.75	3.4	3.05	3.2	2.2	1.1	.....
18	3.2	3.35	3.1	3.2	2.15	1.1	.....
19	2.9	3.4	3.1	3.15	2.1	1.1	.....
20	2.8	3.6	3.15	3.1	2.1	1.05	.....
21	2.75	3.5	3.7	3.1	2.05	1.0	.....
22	2.7	3.4	7.6	3.05	2.0	1.0	.....
23	3.2	3.5	5.6	3.0	2.0	.95	.....
24	8.15	3.5	4.75	3.0	1.95	.95	.....
25	6.6	4.0	4.3	2.95	1.9	.9	.....
26	5.2	4.3	4.0	2.9	1.85	.85	.....
27	4.4	4.0	4.0	2.85	1.85	.85	.....
28	4.0	3.8	5.1	2.8	1.8	.85	.....
29	3.8	.....	4.3	2.75	1.75	.8	.....
30	3.7	.....	4.05	2.75	1.75	.8	.....
31	3.6	.....	3.9	.....	1.7	.....	.....

NOTE.—Creek was dry or water standing in pools from July 12 to Dec. 31.

Daily discharge, in second-feet, of Cache Creek near Yolo, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	270	835	975	975	490	120	3
2	252	790	925	950	490	95	2
3	252	745	880	925	490	83	2
4	235	745	858	925	470	71	2
5	235	722	835	880	450	61	2
6	220	700	812	835	430	51	2
7	220	1,020	790	835	430	42	1
8	220	1,130	745	812	410	42	1
9	220	880	722	790	392	34	1
10	220	1,130	700	768	392	34	1
11	220	1,020	678	768	375	34	1
12	205	925	678	812	358	27	1
13	205	880	678	790	358	27	.....
14	358	858	655	768	340	27	.....
15	812	835	655	745	322	27	.....

Daily discharge, in second-feet, of Cache Creek near Yolo, Cal., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
16	1,240	812	632	722	322	27	.....
17	950	790	632	700	305	20	.....
18	700	768	655	700	288	20	.....
19	570	790	655	678	270	20	.....
20	530	880	678	655	270	15	.....
21	510	835	925	655	252	10	.....
22	490	790	3,650	632	235	10	.....
23	700	835	2,060	610	235	8	.....
24	4,120	835	1,500	610	220	8	.....
25	2,850	1,080	1,240	590	205	6	.....
26	1,780	1,240	1,080	570	190	4.5	.....
27	1,300	1,080	1,080	550	190	4.5	.....
28	1,080	975	1,720	530	175	4.5	.....
29	975	.....	1,240	510	160	3	.....
30	925	.....	1,100	510	160	3	.....
31	880	.....	1,020	.....	145	.....	.....

NOTE.—Daily discharges determined from a well-defined discharge rating curve.

Monthly discharge of Cache Creek near Yolo, Cal., for 1910.

[Drainage area, 1,230 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	4,120	205	766	0.623	0.72	47,100	A.
February	1,240	700	890	.724	.75	49,400	A.
March	3,650	632	1,010	.821	.95	62,100	A.
April	975	510	727	.591	.66	43,300	A.
May	490	145	317	.258	.30	19,500	B.
June	120	3	31.3	.025	.03	1,860	B.
July	3	0	.58	.00047	.0005	36	C.
August	0	0	.0	.0	.0	0	
September	0	0	.0	.0	.0	0	
October	0	0	.0	.0	.0	0	
November	0	0	.0	.0	.0	0	
December	0	0	.0	.0	.0	0	
The year	4,120	0	309	.251	3.41	223,000	

NOTE.—No flow after July 11.

PUTAH CREEK BASIN.

PUTAH CREEK AT WINTERS, CAL.

Putah Creek drains an area comprising about 810 square miles and lying on the eastern slope of the Coast Range south of the Cache Creek basin and north of Napa Valley. It includes the southern part of Lake County, the northern half of Napa County, and small parts of Yolo and Solono counties.

The creek rises in the northwestern corner of the basin, in the St. Helena Range, and flows southeastward into the Yolo basin near Davis, and thence into Sacramento River through Cache Slough. The total length of the creek is about 80 miles. It has numerous tributaries which have a heavy flood discharge in the winter but are

practically dry during the summer. The chief tributaries are Soda Creek from the north and Pope Creek from the west.

The gaging station, which is located in the Rio de los Putos land grant, about 450 feet below the railroad bridge and 800 feet southeast of the railroad station at Winters, was established September 26, 1905.

No important tributaries enter the creek within several miles of the station. No water is diverted above the station, but a small quantity is diverted at the station for irrigation by pumping. Recent filings have been made on water in this basin, and all reservoir sites are embraced within lands held by private ownership.

The gage consists of a series of timbers painted white and located under the cable. The first or low-water section is on the right bank and is nailed vertically to the truck of a cottonwood tree; it has a range of about 6 feet. The second section is on the left bank and is nailed vertically to the stump of a cottonwood tree. The third section is an inclined rod anchored on the left bank with posts. The fourth section is on an eucalyptus tree on top of left bank. The gage has been read daily.

The channel is straight and the main portion is clear. At very high stages the water spreads out over the left bank for about 150 feet, reaching nearly to the foot of the left cable support. At ordinary stages, however, the water remains within the high banks.

Measurements are made during low water by wading at a point about 400 feet above the bridge, but at higher stages they are made by means of a car and cable. For float measurements a course 250 feet long has been marked off by setting posts painted white 250 feet above and parallel with the cable. Floats can be dropped from the railroad bridge above and timed from these posts to the cable.

The records are good except at very low stages, when, owing to the width of channel and its tendency to shift, gage heights are not a reliable index of the flow.

The 1910 rating curve developed after the January flood is fairly well defined and the estimates may be considered good.

Discharge measurements of Putah Creek at Winters, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 31	J. E. Stewart	105	191	5.82	612
Mar. 9	do	88	140	5.05	306
22	do	181	853	9.52	3,570
23	do	180	698	8.68	2,760
May 26[a]	do			4.31	57
July 10[a]	do			3.91	8.9
Aug. 3[a]	W. V. Hardy			3.85	4.8
Oct. 2[a]	W. B. Clapp			3.75	2.4
27[a]	W. V. Hardy			3.82	3.7

[a] Measurement made by wading below cable.

Daily gage height, in feet, of Putah Creek at Winters, Cal., for 1910.

[Erna Wyatt, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.4	5.7	5.7	5.75	4.7	4.2	4.0	3.9	3.75	3.78	3.85	3.92
2	5.2	5.55	5.6	5.65	4.7	4.2	4.0	3.85	3.75	3.76	3.86	3.94
3	5.05	5.45	5.45	5.6	4.7	4.2	3.95	3.85	3.8	3.76	3.88	4.02
4	5.0	5.4	5.35	5.5	4.6	4.2	3.95	3.85	3.8	3.76	3.88	4.04
5	4.9	5.3	5.3	5.4	4.6	4.2	3.95	3.9	3.8	3.76	3.89	4.01
6	4.9	5.2	5.2	5.4	4.6	4.2	3.95	3.85	3.8	3.76	3.89	4.40
7	4.85	5.9	5.2	5.3	4.6	4.1	3.9	3.9	3.8	3.78	3.89	4.30
8	4.85	7.1	5.1	5.25	4.6	4.15	3.9	3.9	3.75	3.78	3.90	4.22
9	4.85	6.2	5.1	5.2	4.55	4.15	3.9	3.9	3.75	3.78	3.90	4.19
10	4.85	6.8	5.0	5.1	4.55	4.15	3.9	3.9	3.7	3.78	3.90	4.20
11	4.9	6.2	4.9	5.2	4.55	4.1	3.9	3.9	3.7	3.80	3.90	4.20
12	4.9	5.9	4.9	5.4	4.5	4.1	3.9	3.9	3.8	3.89	3.90	4.20
13	4.85	5.7	.....	5.3	4.5	4.1	3.85	3.9	3.8	3.91	3.90	4.20
14	6.4	5.6	4.9	5.2	4.5	4.1	3.85	3.9	3.8	3.89	3.90	4.30
15	7.5	5.45	4.9	.....	4.5	4.1	3.85	3.85	3.8	3.82	3.90	4.28
16	7.8	5.35	4.8	5.1	4.4	4.1	3.9	3.85	3.75	3.82	3.90	4.25
17	7.2	5.3	4.8	5.0	4.4	4.1	3.9	3.85	3.75	3.81	3.90	4.21
18	6.3	5.2	4.7	5.0	4.4	4.1	3.85	3.85	3.8	3.81	3.90	4.20
19	5.9	5.2	4.7	4.95	4.35	4.1	3.85	3.85	3.8	3.81	3.90	4.20
20	5.6	5.3	4.9	4.9	4.35	4.1	3.8	3.9	3.8	3.81	3.91	4.18
21	5.4	5.2	6.4	4.9	4.35	4.1	3.8	3.8	3.8	3.80	.....	4.18
22	5.35	5.1	10.9	4.9	4.35	4.1	3.75	3.8	3.8	3.81	3.91	4.18
23	5.4	5.5	9.55	4.85	4.35	4.1	3.75	3.8	3.8	3.81	3.91	4.17
24	16.8	5.5	7.3	4.8	4.3	4.05	3.9	3.75	3.8	3.81	3.90	4.15
25	9.7	8.0	6.2	4.8	4.3	4.05	3.9	3.75	3.8	3.81	3.91	4.15
26	.....	6.9	6.2	4.75	4.3	4.0	3.9	3.75	3.8	3.81	3.91	4.15
27	7.2	6.2	6.2	4.7	4.3	4.0	3.9	3.75	3.8	3.81	3.91	4.15
28	6.65	5.95	7.7	4.7	4.3	4.0	3.9	3.75	3.8	3.81	3.91	4.14
29	6.4	.....	6.5	4.7	4.3	4.0	3.9	3.75	3.8	3.81	3.91	4.12
30	6.0	.....	6.15	4.7	.....	4.0	3.9	3.8	3.8	3.81	3.92	4.12
31	5.85	.....	.....	.....	4.2	.....	3.9	3.75	.....	3.81	.....	4.12

Daily discharge, in second-feet, of Putah Creek at Winters, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	298	560	560	585	150	38	15	8	2	1.6	5.5	9.4
2	203	485	510	535	150	38	15	5.5	2	1.2	6	11
3	152	437	437	510	150	38	12	5.5	3	1.2	7	17
4	137	414	392	460	122	38	12	5.5	3	1.2	7	19
5	111	370	370	414	122	38	12	8	3	1.2	7.4	16
6	111	328	328	414	122	38	12	5.5	3	1.2	7.4	73
7	100	664	328	370	122	25	8	8	3	1.6	7.4	54
8	100	1,440	289	349	122	32	8	8	2	1.6	8	41
9	100	838	289	328	109	32	8	8	2	1.6	8	36
10	100	1,210	252	289	109	32	8	8	1	1.6	8	38
11	111	838	216	328	109	25	8	8	1	3	8	38
12	111	664	216	414	96	25	8	8	3	7.4	8	38
13	100	560	216	370	96	25	5.5	8	3	8.7	8	38
14	1,000	510	216	328	96	25	5.5	8	3	7.4	8	54
15	1,940	437	216	308	96	25	5.5	5.5	3	4	8	51
16	2,200	392	182	289	73	25	8	5.5	2	4	8	46
17	1,680	370	182	252	73	25	8	5.5	2	3.5	8	40
18	921	328	150	252	73	25	5.5	5.5	3	3.5	8	38
19	604	328	150	234	64	25	5.5	5.5	3	3.5	8	38
20	408	370	182	216	64	25	3	8	3	3.5	8.7	35
21	298	328	956	216	64	25	3	3	3	3	8.7	35
22	272	289	4,900	216	64	25	2	3	3	3.5	8.7	35
23	298	460	3,570	199	64	25	2	3	3	3.5	8.7	34
24	12,000	460	1,580	182	54	20	8	2	3	3.5	8	32
25	3,710	2,150	838	182	54	20	8	2	3	3.5	8.7	32
26	2,700	1,280	838	166	54	15	8	2	3	3.5	8.7	32
27	1,510	838	838	150	54	15	8	2	3	3.5	8.7	32
28	1,110	692	1,900	150	54	15	8	2	3	3.5	8.7	30
29	956	.....	1,020	150	54	15	8	2	3	3.5	8.7	28
30	720	.....	808	150	46	15	8	3	3	3.5	9.4	28
31	637	.....	695	.....	38	.....	8	2	.....	3.5	.....	28

NOTE.—Daily discharge determined from two rating curves fairly well defined, one applicable Jan. 1 to 24 and the other Jan. 25 to Dec. 31.

Monthly discharge of Putah Creek near Winters, Cal., for 1910.

[Drainage area, 805 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	12,000	100	1,120	1.39	1.60	68,900	B.
February	2,150	289	644	.800	.83	35,800	A.
March	4,900	150	762	.947	1.09	46,900	A.
April	585	150	300	.373	.42	17,900	A.
May	150	38	87.7	.109	.13	5,390	A.
June	38	15	26.3	.033	.04	1,560	A.
July	15	2	7.85	.0098	.01	483	A.
August	8	2	5.27	.0065	.008	324	A.
September	3	1	2.67	.0033	.004	159	B.
October	8.7	1.2	3.24	.0040	.005	199	B.
November	9.4	5.5	7.98	.0099	.01	475	A.
December	73	9.4	34.7	.043	.05	2,130	A.
The year	12,000	1	249	.309	4.20	180,000	

NORTH PACIFIC OCEAN DRAINAGE BASINS.

RUSSIAN RIVER BASIN.

RUSSIAN RIVER AT GEYSERVILLE, CAL.

Russian River rises in the eastern part of Mendocino County on the west slope of the Coast Range and flows southeastward to its junction with Santa Rosa Creek in Sonoma County, where it turns westward and enters the canyon through which it flows to the Pacific Ocean. The total length of the main river is about 100 miles.

The principal tributaries of Russian River are East Fork, Big Sulphur Creek, Dry Creek, Santa Rosa Creek, and Austin Creek—all very small, except during the rainy season.

Russian River Valley, in Sonoma County, is fertile and well cultivated. The climate is very equable throughout the year and fruit-raising is the important industry. As the climate and soil are especially favorable for the growing of grapes, this valley has become one of the most important wine-producing districts of California.

The gaging station, which is located at the highway bridge on the Tzabaco Spanish land grant, half a mile east of Geyserville, was established December 5, 1910.

As water is diverted from the South Eel to the East Fork of Russian River for power development, the record at this station does not show the natural run-off from the basin but indicates the amount of water available for irrigation.

The gage is painted on the lower caisson of the sixth pier from the right end of the bridge.

Discharge measurements are made from the highway bridge.

The following discharge measurement was made by W. V. Hardy, from bridge:

December 4, 1910: Width, 219 feet; area, 846 square feet; gage height, 10.04 feet; discharge, 354 second-feet.

Daily gage height, in feet, of Russian River at Geyserville, Cal., for 1910.

[Elwin Smith, observer.]

Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.
1		6	9.92	11	9.96	16	9.89	21	9.75	26	9.55
2		7	9.91	12	9.94	17	9.88	22	9.65	27	9.50
3		8	9.90	13	9.94	18	9.84	23	9.65	28	9.50
4	10.40	9	9.85	14	9.90	19	9.78	24	9.50	29	9.50
5	9.98	10	9.92	15	9.90	20	9.70	25	9.55	30	9.45
										31	9.45

EEL RIVER BASIN.

GENERAL FEATURES.

Eel River is formed by the junction of its two headwater tributaries, South Eel and Middle Eel rivers, which rise on the west slope of the Coast Range in the California National Forest, and together with the main Eel drain parts of Lake, Trinity, Mendocino, and Humboldt counties. The principal tributaries below Two Rivers are the North Fork, South Fork, and Van Duzen rivers.

The lower portion of the drainage area, below the mouth of the South Fork, is in the redwood (*Sequoia sempervirens*) belt. The remainder of the area is semi-open and contains very little merchantable timber except on a small tract near Grizzly Mountain. The lowlands are very fertile and well cultivated. The rolling and hills lands are covered with grass and are used only for grazing.

The precipitation throughout the drainage area is very heavy during the winter months.

SOUTH EEL RIVER AT HEARST, CAL.

This station, which is located at the highway bridge at Hearst, about 3 miles below the mouth of Sanhedrin Creek, in sec. 20, T. 19 N., R. 12 W., was established December 7, 1910.

Water is diverted above the station, and is conducted through a tunnel to the basin of the East Fork of Russian River, where it is used by the Snow Mountain Power Co. for power development.

A staff gage in two sections is bolted to the bed rock on the left bank at the bridge, and a third section is painted on the lower caisson of the bridge at the left end.

Discharge measurements are made from the highway bridge.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of South Eel River at Hearst, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 13[a]	W. V. Hardy	10	3.8	(b)	5.4
Dec. 8[c]	do	35	33	8.45	44

[a] Made by wading 600 feet below bridge.
[b] No gage installed.
[c] Made by wading 400 feet below bridge.

Daily gage height, in feet, of South Eel River at Hearst, Cal., for 1910.

[L. S. Neighbor, observer.]

Day.	Dec.	Day.	Dec.	Day.	Dec.	Day..	Dec.	Day.	Dec.	Day.	Dec.
1		6		11	9.62	16	8.30	21	8.10	26	7.97
2		7		12	9.42	17	8.26	22	8.00	27	7.95
3		8	8.45	13	8.80	18	8.20	23	8.00	28	7.95
4		9	9.35	14	8.50	19	8.12	24	8.00	29	7.92
5		10	9.02	15	8.35	20	8.12	25	8.00	30	7.94
										31	7.97

EEL RIVER NEAR SCOTIA, CAL.

This station, which is located in sec. 18, T. 1 N., R. 1 E., at Wildwood Ferry, half a mile below Scotia, was established December 15, 1910.

Van Duzen River enters the Eel about 7 miles below and Laribee Creek about 14 miles above the station.

The staff gage is in four sections on the left bank of the river. The first three sections are 70 feet above the ferry; the upper section is at the mouth of Dean Creek, about 150 feet farther upstream.

Discharge measurements are made from the ferry or a small boat.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Eel River near Scotia, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 17[a]	W. V. Hardy	55	54	(b)	91
Dec. 15[c]	do	480	1,270	11.59	2,110

[a] Made by wading one-half mile below ferry.
[b] No gage installed.
[c] Made from boat about 100 feet above ferry cable.

Daily gage height of Eel River near Scotia, Cal., for 1910.

[Fred Daggett, observer.]

	Feet.		Feet.
Dec. 18	11.59	Dec. 25	11.05
19	11.47	26	11.0
20	11.35	27	10.95
21	11.3	28	10.9
22	11.2	29	10.85
23	11.15	30	10.8
24	11.1	31	10.8

MAD RIVER BASIN.

MAD RIVER NEAR ARCATA, CAL.

Mad River rises in the southern part of Trinity County and flows northwestward across Humboldt County to the Pacific Ocean. The total length of the stream is about 90 miles.

The basin is very narrow and tributaries are unimportant. The upper and lower parts contain good agricultural land; the middle part is suitable only for grazing.

During the rainy season the river is turbulent. In the upper part of its course its channel is practically dry during the summer months, the water standing in pools; farther down flow continues throughout the year, but is insufficient to irrigate all the land that is improved.

The lower course of the river is through the famous redwood (*Sequoia sempervirens*) belt. The remainder of the basin has only a fair forest cover consisting of grass and scrubby timber without much brush.

The gaging station, which is located in sec. 14, T. 6 N., R. 1 E., at the Oregon & Eureka Railroad bridge, 5 miles northeast of Arcata and 1 mile below Warren Creek, was established December 28, 1910.

The gage is a vertical staff in two sections on the right bank at the railroad bridge.

Discharge measurements are made from a highway bridge just above the railroad bridge.

Discharge measurements of Mad River near Arcata, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 20[a]	W. V. Hardy	30	18	(b)	32
Dec. 29[c]	do	100	186	12.70	241

[a] Made by wading just below Warren Creek.
[b] No gage installed.
[c] Made by wading about 200 feet below bridge.

Gage height of Mad River near Arcata, Cal., for 1910.

[Ernest McCloskey, observer.]

	Feet.
Dec. 28	12.7
Dec. 29	12.7
Dec. 30	12.7
Dec. 31	13.0

KLAMATH RIVER BASIN.

GENERAL FEATURES.

Klamath River drains a territory lying east of the Cascade Range in south-central Oregon and south of the Siskiyou Mountains in California. The river rises in upper Klamath Lake, flows generally southward, and reaches the Pacific Ocean at Requa, on the coast of northern California. Only that part of the basin lying in Oregon has been studied in detail. The drainage from this portion of the area is collected in large lakes whose margins are wide shallow marsh lands covered with tules and aquatic plants. From upper Klamath Lake, which stands 4,141 feet above sea level, flows Link River, a stream 1¼ miles long, discharging into Lake Ewauna at an elevation of 4,080 feet. Klamath Falls, the principal city of this section, is located on Link River. From Lake Ewauna to the town of Keno, Klamath River flows through a flat marshy country a distance of 20 miles. About 5 miles above Keno the river is connected with lower Klamath Lake by a channel known as Klamath Straits. During high stages water flows from Klamath River into lower Klamath Lake, and during low water the direction of the flow is reversed. About half a mile below Keno the river breaks over a rocky ledge, and here begins its precipitous fall of 100 to 200 feet per mile to its mouth. The drainage area above Keno, exclusive of lower Klamath Lake, is 3,150 square miles. The streams draining into upper Klamath Lake head about 6,000 feet above sea level. The elevation of Klamath Falls is 4,100 feet.

The principal tributaries of Klamath River are Sprague River, which drains the southwestern rim of the Great Basin divide in Oregon; Anna River, which heads in a large spring supposed to be fed by the waters of Crater Lake; Scott River, which drains a rich agricultural valley extending from Fort Jones to French Gulch; and Trinity River, which drains a portion of the western slope of Trinity Mountain. Williamson River, which drains the northern part of the Klamath Indian Reservation, is tributary to Sprague River. Lost River, although not a tributary of the Klamath, is usually considered with it, as a slough connects the two. Water formerly flowed in either direction, depending on which stream was higher, but the flow is now stopped by an artificial dike.

The chief tributary of Trinity River is the South Fork, which joins the main river a few miles below Hawkins Bar.

UPPER KLAMATH LAKE NEAR KLAMATH FALLS, OREG.

Upper Klamath Lake is to be used by the United States Reclamation Service as a source of water supply to irrigate large areas of land. The main canal of the Klamath project has its intake at the lake.

A gage was installed on this lake near Klamath Falls, Oreg., May 28, 1904. The elevation of the zero of the gage is 4,136.13 feet above sea level. The daily records since February 16, 1906, are the mean daily heights obtained from a Friez automatic water gage.

The winds have a marked effect on the level of the water surface of this lake. The water is lowered as much as 6 inches near the outlet when the wind blows from the south, and is raised as much over its normal level when the wind is in the opposite direction. Differences of a foot are frequently noticeable within a few hours. If the wind effect were eliminated the lake heights would show much more gradual changes than indicated by the accompanying records.

Data for this station are furnished by the United States Reclamation Service.

Daily gage height, in feet, of Upper Klamath Lake near Klamath Falls, Oreg., for 1910.

[A. J. Santaman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.00	.....	5.75	6.70	6.10	5.90	4.90	4.50	.....	4.60	.....	5.58
2	6.00	.....	5.90	6.80	6.08	5.60	.....	4.43	.....	4.20	.....	5.55
3	6.00	5.40	6.00	6.62	6.10	5.55	.....	4.48	4.30	4.76	.....	5.50
4	6.00	5.40	5.90	6.58	6.05	5.30	.....	4.35	4.30	.....	.....	5.49
5	6.00	5.40	5.95	6.60	6.05	5.35	.....	4.33	4.32	.....	4.78	5.49
6	6.00	5.40	6.00	6.51	6.00	5.35	.....	4.59	4.35	4.49	4.75	5.49
7	6.00	5.40	6.10	6.45	5.92	5.30	.....	4.56	4.30	4.47	4.95	5.52
8	6.00	5.41	6.17	6.45	5.85	5.18	.....	4.51	4.30	4.45	5.09	5.55
9	6.00	5.43	6.23	6.30	5.66	5.10	4.80	4.51	4.31	4.42	.....	5.68
10	5.90	5.45	6.30	6.10	5.90	5.10	4.80	4.51	.....	4.50	.....	5.74
11	5.90	5.50	6.35	6.52	5.90	5.35	4.80	4.54	.....	4.63	.....	5.77
12	5.80	5.50	6.43	6.60	5.80	5.35	4.75	4.59	.....	4.65	5.00	5.79
13	5.60	5.41	6.46	6.55	5.65	5.40	4.70	4.50	.....	4.70	4.95	5.80
14	5.50	5.42	6.45	6.40	5.60	5.25	4.50	4.53	.....	4.75	5.00	5.80
15	5.50	5.43	6.46	6.37	5.44	5.30	4.55	4.50	.....	4.61	4.95	5.89
16	5.50	5.43	6.51	6.35	5.40	5.15	4.62	.....	.....	4.70	4.94	6.14
17	5.50	5.43	6.20	6.30	5.42	5.10	4.75	.....	4.52	4.72	5.05	6.25
18	5.50	5.43	6.30	6.10	5.50	4.60	4.62	.....	4.50	4.71	5.20	6.30
19	5.50	5.40	5.90	6.35	5.50	4.80	4.50	.....	4.60	4.65	4.96	6.30
20	5.50	5.40	6.00	6.30	5.40	4.80	4.56	4.31	4.28	4.63	4.99	6.30
21	5.50	5.38	6.00	6.25	5.25	4.80	4.70	4.30	4.32	4.65	5.18	6.30
22	5.50	5.39	6.13	6.20	5.20	4.76	4.60	4.31	4.30	4.60	5.22	6.30
23	.....	5.38	6.13	6.45	5.10	4.70	4.55	4.50	4.32	4.68	5.40	6.30
24	.....	5.45	6.23	6.30	5.20	4.70	4.55	4.30	4.65	4.68	5.45	6.14
25	.....	5.45	6.33	6.40	5.10	4.94	4.55	4.30	4.58	4.67	5.45	5.70
26	.....	5.50	6.70	6.40	5.20	4.98	4.55	4.30	4.58	4.82	5.43	5.73
27	.....	5.60	7.00	6.40	5.20	5.02	4.50	.....	4.59	4.82	5.47	5.71
28	.....	5.65	6.95	6.40	5.65	4.92	4.45	.....	4.62	4.78	5.57	5.69
29	.....	.....	6.85	6.35	5.75	5.05	4.50	.....	4.59	.....	5.56	5.66
30	.....	.....	6.90	6.20	5.70	4.98	4.48	.....	4.60	.....	5.60	5.87
31	.....	.....	6.90	.....	5.75	.....	4.59	.....	.....	.....	.....	5.80

NOTE.—Gage heights obtained by means of a Friez self-recording gage. Gage heights Dec. 1 to 5, interpolated. Lake probably frozen during January and the first part of February and after about Dec. 13.

LINK RIVER AT KLAMATH FALLS, OREG.

This station, which is located in sec. 32, T. 38 S., R. 9 E., at the county bridge over Link River at Klamath Falls, 1¼ miles below the outlet of Upper Klamath Lake and immediately at the head of Lake Ewauna, was established May 15, 1904. The river has a fall of 70 feet in the 1¼ miles between the lakes, a portion of which is utilized for water power.

The records prior to June 6, 1908, especially the individual daily records, are not reliable. It is probable that for longer periods—a month or more—the total flow as determined is not greatly in error. This condition is accounted for by the effect of wind on the flow of water at this station. The original gage was located at the bridge at the upper end of Lake Ewauna. At the outlet of Upper Klamath Lake the river breaks over a rather shallow ledge. A strong wind upstream blows the water back from this outlet and at the same time increases the height of water on the gage by backing the water in Lake Ewauna. So great is this wind effect that the river has been known to go entirely dry for a few hours at a time. When the wind is downstream the flow of Link River is greatly increased; but owing to the large surface of Lake Ewauna this increase in flow is not shown by the gage heights. In the long run these wind effects are no doubt compensatory, but little dependence can be placed in the published daily records prior to March 7, 1908. On this date an anemometer was installed on the bridge and a ship's taffrail log was trailed in the water under the bridge. It was hoped that the daily reading from this log would afford some indication of the velocities with the anemometer records. Although the records obtained by this device were much more reliable during 1907 than previously, even they were not all that could be desired. It became evident that owing to the sudden changes of the wind complete data could not be obtained without automatic recording devices on both the log and anemometer. The method was effective, however, in reducing the probable error of the estimates from about 15 per cent to within less than 5 per cent. On June 6, 1908, a Friez gage was installed in the rapids, where it could be affected only by change in flow, measurements being made at the bridge as formerly.

For the remainder of 1908 and for 1909 the records obtained are reliable. During 1910 water was diverted around the Friez gage in the rapids, for use by the power plant operated by Moore Bros. This water was returned to the river between the Friez gage and the gage at the bridge. No daily record was kept of the amount of water thus diverted around the Friez gage, although several measurements of the amount of water in Moore Bros.' flume were made. Only one measurement was referred to the Friez gage during the

year. The Friez gage readings were also somewhat affected by backwater from log jams. The daily discharge for 1910 must therefore be determined from the gage at the bridge, subject to all the uncertainties noted above.

This station was maintained during 1910 by the United States Reclamation Service, but the daily and monthly discharge tables were computed by the United States Geological Survey.

Discharge measurements of Link River at Klamath Falls, Oreg., in 1910.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec. ft.*
Mar. 17	John Yadon	[a] 5.08	4,520
July 29	do	2.90	1,180
Aug. 25	Leland Moser	[b] 2.57	1,160
Dec. 12	do	3.90	3,320
18	do	4.12	3,640
28	do	4.15	3,240

[a] Friez gage read 3.20 feet.
[b] Friez gage read 0.91 foot.

NOTE.—Gage heights refer to the gage at the bridge.

Daily gage height, in feet, of Link River at Klamath Falls, Oreg., for 1910.

[Friez gage.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.42	2.27	2.36	3.30	2.80	2.75	1.90	1.15	0.90	1.02	.....	1.71
2	2.40	2.24	2.48	3.55	2.78	2.48	1.90	1.10	.91	1.20	.....	1.70
3	2.37	2.24	2.55	3.35	2.80	2.51	2.20	1.00	1.00	1.00	.....	2.05
4	2.34	2.24	2.65	3.32	2.71	2.55	2.15	1.10	.92	1.09	.....	2.09
5	2.31	2.04	2.75	3.35	2.72	2.46	2.15	.98	.89	1.10	1.00	2.11
6	2.28	2.04	2.84	3.25	2.68	2.50	2.20	1.08	.98	1.11	.96	2.09
7	2.28	2.04	2.89	3.22	2.48	2.45	2.35	1.02	1.00	1.09	1.10	2.11
8	2.37	2.03	2.97	3.22	2.40	2.41	2.32	1.02	.88	1.10	1.00	2.15
9	2.36	2.03	3.01	2.78	2.15	2.41	2.35	.95	.88	1.08	.98	2.24
10	2.35	2.02	3.05	3.05	2.17	2.60	2.35	.95	.95	.98	1.30	2.26
11	2.31	2.02	3.08	3.22	2.25	2.70	2.52	.93	1.08	1.05	1.49	2.28
12	2.20	2.07	3.14	3.22	2.28	2.56	2.50	1.02	.99	1.21	1.46	2.30
13	2.18	2.08	3.15	3.15	2.26	2.60	2.42	1.08	.80	1.28	1.45	2.32
14	2.18	2.10	3.15	3.10	2.29	2.20	2.05	1.03	.89	1.35	1.39	2.34
15	2.18	2.09	3.17	3.08	2.25	2.05	2.20	1.06	.87	1.28	1.34	2.40
16	2.15	2.06	3.19	3.10	2.20	1.76	2.40	1.08	.85	1.28	1.33	2.58
17	2.12	2.05	3.18	3.06	2.40	1.65	2.70	.98	.98	1.35	1.38	2.61
18	2.12	2.08	2.95	2.90	2.70	1.50	2.45	.85	1.22	1.35	1.37	2.48
19	2.11	2.10	3.18	3.10	2.65	1.46	2.20	.80	1.19	1.28	1.35	2.45
20	2.08	2.10	3.24	3.08	2.53	1.65	1.60	.75	.89	1.28	1.39	2.45
21	2.09	2.07	3.28	3.04	2.53	1.80	1.25	.88	.88	1.29	1.45	2.40
22	2.14	2.06	3.42	2.98	2.53	1.85	1.22	.88	.92	1.22	1.50	2.39
23	2.14	2.06	3.40	2.92	2.35	1.95	1.20	.94	.98	1.19	1.73	2.34
24	2.13	2.15	3.45	2.80	2.58	1.90	1.20	1.20	1.02	1.14	1.72	2.38
25	2.17	2.15	3.25	2.85	2.45	2.00	1.20	.91	1.10	1.21	1.68	2.35
26	2.18	2.13	3.20	2.90	2.38	2.20	1.20	.82	1.02	1.28	1.45	2.32
27	2.19	2.20	3.50	2.95	2.47	2.24	1.20	.90	1.00	1.12	1.60	2.31
28	2.21	2.30	3.45	2.86	2.22	2.50	1.10	.91	1.00	1.10	1.71	2.29
29	2.25	.....	3.40	2.89	2.45	2.40	1.06	1.10	1.02	1.10	1.79	2.28
30	2.26	.....	3.41	2.88	2.45	2.10	1.10	.88	1.00	1.08	1.80	2.30
31	2.33	.....	3.40	.....	2.65	.....	1.10	.90	.....	1.09	.....	2.32

NOTE.—Gage heights affected by back water from log jam below the gage May 19, to July 21. Records for Nov. 1 to 4 are uncertain and have been discarded.

Daily gage height, in feet, of Link River at Klamath Falls, Oreg., for 1910.

[Gage at bridge. Vincent Yaden, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.3	4.2	4.45	5.4	5.05	4.15	3.35	2.75	2.55	2.6	3.05	3.65
2	4.25	4.3	4.45	5.7	5.05	4.1	3.35	2.75	2.55	2.7	3.15	3.65
3	4.25	4.3	4.5	5.4	5.1	4.1	3.5	2.8	2.6	2.7	2.95	3.7
4	4.25	4.25	4.55	5.4	5.1	4.15	3.35	2.8	2.6	2.65	2.95	3.65
5	4.25	4.2	4.6	5.4	5.05	4.1	3.3	2.75	2.6	2.75	2.95	3.7
6	4.25	4.2	4.65	5.35	5.05	4.1	3.3	2.7	2.55	2.75	2.9	3.75
7	4.25	4.2	4.7	5.35	5.0	4.0	3.25	2.75	2.55	2.75	3.0	3.75
8	4.25	4.2	4.75	5.4	4.95	4.0	3.2	2.75	2.6	2.75	3.15	3.8
9	4.25	4.25	4.75	5.4	4.95	4.0	3.2	2.75	2.6	2.85	3.1	3.95
10	4.25	4.2	4.85	5.4	4.9	4.0	3.2	2.75	2.55	2.85	3.25	3.95
11	4.25	4.2	4.9	5.4	4.75	4 0	3.2	2.7	2.6	2.9	3.0	3.95
12	4.4	4.2	4.9	5.35	4.75	4.0	3.2	2.65	2.6	3.0	3.0	3.95
13	4.4	4.25	4.95	5 35	4.55	4.0	3.2	2.65	2.6	2.9	3.05	3.95
14	4.3	4.2	5.0	5.3	4.45	3.95	3.15	2.65	2.55	2.85	3.05	4.0
15	4.25	4.2	5.0	5.3	4.45	3.85	3.15	2.6	2.55	2.85	3.1	4.0
16	4.2	4.2	5.05	5.3	4.55	3.75	3.05	2.6	2.6	2.85	3.05	4.0
17	4.2	4.25	5.05	5.35	4.5	3.8	3.0	2.65	2.55	2.9	3.1	4.2
18	4.15	4.2	5.2	5.4	4.55	3.8	3.0	2.65	2.55	2.9	3.15	4.1
19	4.2	4.2	5.15	5.35	4.5	3.8	3.0	2.6	2.7	3.0	3.1	4.1
20	4.2	4.25	5.15	5.3	4.5	3.6	3.0	2.6	2.65	2.95	3.1	4.1
21	4.15	4.3	5.2	5.25	4.45	3.55	3.05	2.6	2.6	2.95	3.25	4.15
22	4.2	4.25	5.2	5.25	4.45	3.55	2.95	2.6	2.6	3.0	3.15	4.15
23	4.2	4.25	5.3	5.25	4.45	3.5	2.95	2.55	2.6	2.95	3.4	4.15
24	4.25	4.3	5.3	5.2	4.45	3.5	2.95	2.55	2.6	2.95	3.45	4.1
25	4.3	4.35	5.35	5.3	4.35	3.5	2.95	2.55	2.6	3.0	3.4	4.15
26	4.25	4.3	5.4	5.15	4.35	3.5	2.9	2.6	2.6	3.0	3.45	4.05
27	4.2	4.3	5.4	5.25	4.25	3.45	2.9	2.55	2.6	3.0	3.55	4.0
28	4.2	4.45	5.35	5.15	4.2	3.5	2.9	2.6	2.65	3.0	3.5	4.15
29	4.2	.....	5.4	5.05	4.15	3.45	2.9	2.6	2.6	3.0	3.55	4.1
30	4.25	.....	5.4	5.1	4.1	3.45	2.9	2.6	2.6	3.0	3.55	4.15
31	4.2	.....	5.4	.....	4.2	.....	2.85	2.6	.....	.....	.....	4.15

Daily discharge, in second-feet, of Link River at Klamath Falls, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,900	2,740	3,140	4,930	4,240	2,660	1,640	1,120	1,010	1,040	1,340	1,980
2	2,820	2,900	3,140	5,570	4,240	2,590	1,640	1,120	1,010	1,090	1,440	1,980
3	2,820	2,900	3,230	4,930	4,340	2,590	1,800	1,150	1,040	1,090	1,260	2,040
4	2,820	2,820	3,320	4,930	4,340	2,660	1,640	1,150	1,040	1,060	1,260	1,980
5	2,820	2,740	3,400	4,930	4,240	2,590	1,580	1,120	1,040	1,120	1,260	2,040
6	2,820	2,740	3,490	4,830	4,240	2,590	1,580	1,090	1,010	1,120	1,220	2,110
7	2,820	2,740	3,580	4,830	4,150	2,450	1,540	1,120	1,010	1,120	1,300	2,110
8	2,820	2,740	3,680	4,930	4,060	2,450	1,480	1,120	1,040	1,120	1,440	2,180
9	2,820	2,820	3,680	4,930	4,060	2,450	1,480	1,120	1,040	1,180	1,390	2,380
10	2,820	2,740	3,860	4,930	3,960	2,450	1,480	1,120	1,010	1,180	1,540	2,380
11	2,820	2,740	3,960	4,930	3,680	2,450	1,480	1,090	1,040	1,220	1,300	2,380
12	3,060	2,740	3,960	4,830	3,680	2,450	1,480	1,060	1,040	1,300	1,300	2,380
13	3,060	2,820	4,060	4,830	3,320	2,450	1,480	1,060	1,040	1,220	1,340	2,380
14	2,900	2,740	4,150	4,730	3,140	2,380	1,440	1,060	1,010	1,180	1,340	2,450
15	2,820	2,740	4,150	4,730	3,140	2,240	1,440	1,040	1,010	1,180	1,390	2,450
16	2,740	2,740	4,240	4,730	3,320	2,110	1,340	1,040	1,040	1,180	1,340	2,450
17	2,740	2,820	4,240	4,830	3,230	2,180	1,300	1,060	1,010	1,220	1,390	2,740
18	2,660	2,740	4,530	4,930	3,320	2,180	1,300	1,060	1,010	1,220	1,440	2,590
19	2,740	2,740	4,440	4,830	3,230	2,180	1,300	1,040	1,090	1,300	1,390	2,590
20	2,740	2,820	4,440	4,730	3,230	1,920	1,300	1,040	1,060	1,260	1,390	2,590
21	2,660	2,900	4,530	4,630	3,140	1,860	1,340	1,040	1,040	1,260	1,540	2,660
22	2,740	2,820	4,530	4,630	3,140	1,860	1,260	1,040	1,040	1,300	1,440	2,660
23	2,740	2,820	4,730	4,630	3,140	1,800	1,260	1,010	1,040	1,260	1,690	2,660
24	2,820	2,900	4,730	4,530	3,140	1,800	1,260	1,010	1,040	1,260	1,740	2,590
25	2,900	2,980	4,830	4,730	2,980	1,800	1,260	1,010	1,040	1,300	1,690	2,660
26	2,820	2,900	4,930	4,440	2,980	1,800	1,220	1,040	1,040	1,300	1,740	2,520
27	2,740	2,900	4,930	4,630	2,820	1,740	1,220	1,010	1,040	1,300	1,860	2,450
28	2,740	3,140	4,830	4,440	2,740	1,800	1,220	1,040	1,060	1,300	1,800	2,660
29	2,740	.....	4,930	4,2:0	2,660	1,740	1,220	1,040	1,040	1,300	1,860	2,590
30	2,820	.....	4,930	4,340	2,590	1,740	1,220	1,040	1,040	1,300	1,860	2,660
31	2,740	.....	4,930	.....	2,740	.....	1,180	1,040	.....	1,320	.....	2,660

NOTE.—Daily discharges determined from the gage heights at the bridge and a rating table that is poorly defined on account of the effect of wind. The estimate for any one day may be 25 per cent or more in error.

Monthly discharge of Link River at Klamath Falls, Oreg., for 1910.

[Drainage area, 3,110 square miles.]

Month.	Discharge in second-feet.				Run-off.		
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	Accuracy.
January	3,060	2,660	2,810	0.904	1.04	173,000	C.
February	3,140	2,740	2,820	.907	.94	157,000	C.
March	4,930	3,140	4,180	1.34	1.54	257,000	C.
April	5,570	4,240	4,770	1.53	1.71	284,000	C.
May	4,340	2,590	3,460	1.11	1.28	213,000	C.
June	2,660	1,740	2,200	.707	.79	131,000	C.
July	1,800	1,180	1,400	.450	.52	86,100	C.
August	1,150	1,010	1,070	.344	.40	65,800	C.
September	1,090	1,010	1,030	.331	.37	61,300	C.
October	1,320	1,040	1,210	.389	.45	74,400	C.
November	1,860	1,220	1,480	.476	.53	88,100	C.
December	2,740	1,980	2,420	.778	.90	149,000	C.
The year	5,570	1,010	2,400	.772	10.47	1,740,000	

NOTE.—Determinations of monthly discharge are provisional and subject to revision when more measurements referred to the Friez gage are available.

KLAMATH RIVER AT KENO, OREG.

This station, which is located at the county bridge at Keno, in sec. 31, T. 39 S., R. 8 E., at the lower end of the lakes and marshes that form the headwaters of Klamath River, was established May 31, 1904. The United States Reclamation Service is reclaiming lands for irrigation in two ways—by diverting waters from Klamath Lake and by draining the large swamp areas bordering this stream and the lakes which are tributary to it. Immediately below the station the river breaks over a rocky ledge with a fall of about 200 feet to the mile.

During the winter the river usually freezes over, but as the water is comparatively deep and the ice is not very thick the accuracy of records has not been greatly affected by the ice. At low stages a growth of aquatic plants clogs the section and to some extent lessens the accuracy of the results. An additional source of error has resulted from the effect of wind on the wide expanse of water above the station. A strong upstream wind will blow the water back from the outlet and diminish the flow, but as the gage is located at the bridge, 1,000 feet above the gaging site, gage heights are not always affected to a corresponding degree. The datum of the gage has not been changed since it was installed.

Discharge measurements are made from a cable 1,000 feet below the gage.

This station was not visited in 1910, but conditions seem to be fairly permanent, and the 1909 discharge rating curve is believed to give reasonably close results. The station was maintained during 1910 by the United States Reclamation Service, but the daily and monthly discharge tables were computed by the United States Geological Survey.

Daily gage height, in feet, of Klamath River at Keno, Oreg., for 1910.

[H. Snowgoose, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	13.2	13.25	13.5	13.9	13.8	13.05	12.4	11.95	11.75	11.65	12.15	12.55
2	13.2	13.25	13.5	13.9	13.8	13.1	12.35	11.95	11.7	11.85	12.1	12.6
3	13.2	13.25	13.5	13.9	13.8	13.1	12.4	11.85	11.6	11.75	12.1	12.6
4	13.2	13.25	13.55	13.9	13.8	13.1	12.4	11.95	11.75	11.9	12.1	12.65
5	13.25	13.3	13.55	13.9	13.8	13.0	12.4	11.9	11.75	11.9	12.1	12.65
6	13.25	13.3	13.55	13.95	13.75	13.0	12.4	11.9	11.7	11.9	12.1	12.7
7	13.25	13.3	13.6	13.95	13.75	13.0	12.4	11.9	11.75	11.9	12.1	12.7
8	13.3	13.3	13.6	13.95	13.75	13.0	12.35	11.9	11.7	11.9	12.15	12.7
9	13.3	13.3	13.65	13.95	13.7	12.95	12.35	11.85	11.65	12.0	12.15	12.75
10	13.3	13.3	13.65	13.9	13.7	12.95	12.35	11.85	11.65	11.9	12.25	12.8
11	13.3	13.3	13.65	13.95	13.65	12.9	12.35	11.85	11.75	12.0	12.1	12.8
12	13.3	13.3	13.65	13.9	13.6	12.9	12.3	11.8	11.75	12.1	12.1	12.8
13	13.3	13.3	13.65	13.95	13.55	12.9	12.3	11.8	11.7	12.0	12.15	12.85
14	13.2	13.3	13.7	13.9	13.55	12.85	12.25	11.8	11.7	12.0	12.15	12.85
15	13.2	13.3	13.7	13.95	13.5	12.85	12.25	11.8	11.75	12.0	12.15	12.85
16	13.2	13.3	13.7	13.95	13.45	12.8	12.25	11.8	11.65	12.0	12.15	12.85
17	13.2	13.3	13.75	13.95	13.4	12.75	12.15	11.85	11.65	12.05	12.15	12.95
18	13.2	13.3	13.8	13.95	13.4	12.75	12.15	11.85	11.75	12.05	12.2	12.95
19	13.2	13.3	13.8	13.95	13.35	12.75	12.15	11.8	11.85	12.1	12.2	12.95
20	13.2	13.3	13.8	13.95	13.35	12.65	12.15	11.7	11.8	12.05	12.2	12.95
21	13.2	13.3	13.8	13.95	13.35	12.65	12.05	11.75	11.8	12.05	12.3	12.95
22	13.2	13.35	13.85	13.95	13.35	12.6	12.15	11.75	11.85	12.05	12.25	12.95
23	13.2	13.35	13.85	13.95	13.35	12.6	12.1	11.75	11.85	12.05	12.4	12.95
24	13.2	13.35	13.9	13.9	13.3	12.6	12.1	11.75	11.85	12.1	12.45	12.95
25	13.2	13.4	13.9	13.9	13.25	12.6	12.1	11.75	11.85	12.1	12.45	12.95
26	13.2	13.4	13.9	13.85	13.2	12.55	12.05	11.7	11.85	12.1	12.45	12.95
27	13.2	13.4	13.9	13.85	13.15	12.4	12.05	11.75	11.85	12.1	12.5	12.95
28	13.2	13.4	13.9	13.8	13.15	12.5	12.05	11.65	11.85	12.1	12.5	12.95
29	13.2	.....	13.9	13.8	13.1	12.5	12.0	11.7	11.85	12.1	12.5	12.95
30	13.2	.....	.....	13.8	13.15	12.45	12.0	11.75	11.85	12.1	12.5	12.95
31	13.25	.....	.....	.....	13.15	.....	12.0	11.65	.....	12.1	.....	12.95

NOTE.—Relation between gage heights and discharge at this station little affected by ice.

Daily discharge, in second-feet, of Klamath River at Keno, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,690	2,780	3,250	4,080	3,870	2,440	1,510	1,020	870	810	1,220	1,700
2	2,690	2,780	3,250	4,080	3,870	2,520	1,450	1,020	840	935	1,160	1,760
3	2,690	2,780	3,250	4,080	3,870	2,520	1,510	935	780	870	1,160	1,760
4	2,690	2,780	3,350	4,080	3,870	2,520	1,510	1,020	870	970	1,160	1,830
5	2,780	3,870	3,350	4,080	3,870	2,360	1,510	970	870	970	1,160	1,830
6	2,780	2,870	3,350	4,190	3,760	2,360	1,510	970	840	970	1,160	1,900
7	2,780	2,870	3,450	4,190	3,760	2,360	1,510	970	870	970	1,160	1,900
8	2,870	2,870	3,450	4,190	3,760	2,360	1,450	970	840	970	1,220	1,900
9	2,870	2,870	3,560	4,190	3,660	2,280	1,450	935	810	1,060	1,220	1,980
10	2,870	2,870	3,560	4,080	3,660	2,280	1,450	935	810	970	1,330	2,050
11	2,870	2,870	3,560	4,190	3,560	2,200	1,450	935	870	1,060	1,160	2,050
12	2,870	2,870	3,560	4,080	3,450	2,200	1,390	900	870	1,160	1,160	2,050
13	2,870	2,870	3,560	4,190	3,350	2,200	1,390	900	840	1,060	1,220	2,120
14	2,690	2,870	3,660	4,080	3,350	2,120	1,330	900	840	1,060	1,220	2,120
15	2,690	2,870	3,660	4,190	3,250	2,120	1,330	900	870	1,060	1,220	2,120
16	2,690	2,870	3,660	4,190	3,160	2,050	1,330	900	810	1,060	1,220	2,120
17	2,690	2,870	3,760	4,190	3,060	1,980	1,220	935	810	1,110	1,220	2,230
18	2,690	2,870	3,870	4,190	3,060	1,980	1,220	935	870	1,110	1,270	2,280
19	2,690	2,870	3,870	4,190	2,960	1,980	1,220	900	935	1,160	1,270	2,280
20	2,690	2,870	3 870	4,190	2,960	1,830	1,220	840	900	1,110	1,270	2,280
21	2,690	2,870	3,870	4,190	2,960	1,830	1,110	870	900	1,110	1,390	2,280
22	2,690	2,960	3,980	4,190	2,960	1,760	1,220	870	935	1,110	1,330	2,280
23	2,690	2,960	3,980	4,190	2,960	1,760	1,160	870	935	1,110	1,510	2,280
24	2,690	2,960	4,080	4,080	2,870	1,760	1,160	870	935	1,160	1,570	2,280
25	2,690	3,060	4,080	4,080	2,780	1,760	1,160	870	935	1,160	1,570	2,280
26	2,690	3,060	4,080	3,980	2,600	1,700	1,110	840	935	1,160	1,570	2,280
27	2,690	3,060	4,080	3,980	2,600	1,510	1,110	870	935	1,160	1,630	2,280
28	2,690	3,060	4,080	3,870	2,600	1,630	1,110	810	935	1,160	1,630	2,280
29	2,690	.....	4,080	3,870	2,520	1,630	1,060	840	935	1,160	1,630	2,280
30	2,690	.....	4,080	3,870	2,600	1,570	1,060	870	935	1,160	1,630	2,280
31	2,780	.....	4,080	.....	2,600	.....	1,060	810	.....	1,160	.....	2,280

NOTE.—Daily discharge determined from a rating curve fairly well defined for 1909 but somewhat uncertain for 1910 on account of the lack of measurements.

Monthly discharge of Klamath River at Keno, Oreg., for 1910.

[Drainage area, 3,150 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	2,870	2,690	2,740	0.870	1.00	168,000	B.
February	3,060	2,780	2,890	.917	.95	160,000	B.
March	4,080	3,250	3,720	1.18	1.36	229,000	B.
April	4,190	3,870	4,110	1.30	1.45	245,000	B.
May	3,870	2,520	3,230	1.03	1.19	199,000	B.
June	2,520	1,510	2,050	.651	.73	122,000	B.
July	1,510	1,060	1,300	.413	.48	79,900	B.
August	1,020	810	909	.289	.33	55,900	B.
September	935	780	878	.279	.31	52,200	B.
October	1,160	810	1,070	.340	.39	65,800	B.
November	1,630	1,160	1,320	.419	.47	78,600	B.
December	2,280	1,700	2,110	.670	.77	130,000	B.
The year	4,190	780	2,190	.695	9.43	1,590,000	

KLAMATH RIVER NEAR REQUA, CAL.

This station, which is located at Nye's ranch in sec. 29, T. 13 N., R. 2 E., 9 miles above Requa, was established December 25, 1910. It is 30 miles below the mouth of Trinity River and 10 miles above the mouth of Klamath River.

The staff gage is in four sections on the right bank near the ferry.

Discharge measurements are made from the ferry or a small boat.

Discharge measurements of Klamath River near Requa, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
Aug. 31[a]	W. V. Hardy	350	1,880	(b)	2,430
Dec. 25[c]	do	570	3,620	8.78	10,300

[a] Made from canoe 500 feet above cable at Nye's ranch.
[b] No gage installed. Approximate gage height 5.78 feet, determined Dec. 25.
[c] Made from canoe at gage.

Daily gage height of Klamath River near Requa, Cal., for 1910.

[M. F. Scofield, observer.]

	Feet.		Feet.
December 25	8.78	December 29	8.40
December 26	8.63	December 30	8.43
December 27	8.56	December 31	8.37
December 28	8.45		

WILLIAMSON RIVER NEAR KLAMATH AGENCY, OREG.

This station, which is located 13 miles northeast of the Klamath Agency, in the NW. ¼ sec. 1, T. 33 S., R. 7 E., at a point locally known as Rocky Ford, at the lower extremity of Klamath Marsh, was established March 26, 1908, in cooperation with the United States Office of Indian Affairs, and discontinued June 26, 1910, as the observer moved away and no other was obtainable.

The nearest tributary is Spring Creek, 11 miles below the station. Owing to the inaccessibility of the station, it has not been practicable to obtain continuous records of discharge. During the winter months it is almost impossible to reach the station on account of snow.

Discharge measurements are made from a cable and car.

The staff gage was originally located about 1,000 feet above the cable. On October 17, 1908, a Bristol self-registering gage was installed, and as this required only weekly visits by the observer, continuous records were obtained during the remainder of the year. The gage was moved May 30, 1909, to a point 100 feet downstream at the location of the cable. It was set to read the same as at the former location, but on account of the slope of the river there is no constant relation. The datum of the gage as reset is at an elevation of 4,622.19 feet above sea level. On November 10, 1909, an auxiliary staff gage was installed below the mouth of Spring Creek to be used when the regular station is inaccessible. Simultaneous readings were made on both gages from November, 1909, to June, 1910. The upper gage was washed out during the high water of March, 1910, and was replaced April 15, with a Bristol self-recording gage.

In the meantime weekly readings were continued on the lower gage. The relation between the two gages has been determined and the gage heights for the missing period have been estimated.

Owing to the large storage capacity in Klamath Marsh the river is not subject to great fluctuations. It is probable that weekly observations will give sufficient data for an estimate of the flow.

The accuracy of the results is somewhat affected by the growth of aquatic plants in the river channel during the season, and a comparatively large number of measurements will be necessary in order to secure reliable results. The data herewith were obtained by usual methods, using a mean curve. The following measurement was made by Leland Moser[1] August 11, 1910: Width, 80 feet; area of section, 150 square feet; gage height, 0.54 feet; discharge, 55.2 second-feet.

[1] The results of this measurement are very uncertain, as the velocity was very low and the whole river bed was covered with grass and tules.

Daily gage height, in feet, of Williamson River near Klamath Agency, Oreg., for 1910.

[Gage at Rockyford. R. C. Spink, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1					1.7	
2	1.8			2.6	1.7	
3					1.65	
4					1.65	
5					1.65	
6		1.45	2.7		1.65	1.0
7					1.65	1.0
8					1.65	1.0
9	1.6				1.6	1.0
10				2.5	1.6	1.0
11					1.55	1.0
12					1.55	1.0
13		1.25	3.7		1.5	1.0
14					1.5	.95
15				2.1	1.5	.95
16	1.2			2.1	1.5	.95
17				2.1	1.3	.95
18				2.1	1.2	.9
19				2.1	1.0	.9
20		1.25	3.4	1.9	1.05	
21				1.85	1.35	
22				1.9	1.2	
23	1.15			1.85	1.2	
24				1.85	1.1	
25				1.75	1.1	
26				1.8	1.1	.9
27		1.6	3.1	1.75	1.0	
28				1.7	1.0	
29				1.7	1.1	
30	1.45			1.7		
31						

NOTE.—Gage heights Apr. 15 to June 26, obtained by means of a Bristol automatic pressure gage. The river was frozen most of the time during January and February. The ice was breaking up Feb. 27, and the channel probably cleared soon after. Gage heights for Mar. 13 to April 10 have been estimated from those observed below Spring Creek.

Daily gage height, in feet, of Williamson River below Spring Creek, near Klamath Agency, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1							16	0.20					
2	0.70			1.10			17						
3							18						
4							19						0.0
5							20		0.10	1.90			
6		0.20	1.30			0.0	21						
7							22					1.5	
8					0.27		23	.17					
9	.60						24				0.35		
10				1.00			25						
11							26						.0
12						.0	27		.10	1.60			
13		.15	2.20				28						
14							29					.10	
15					.20		30	.25			.30		
							31						

NOTE.—Daily discharge determined by means of the gage heights at Rocky Ford and a fairly well-defined discharge rating curve—the same as that used for 1909. The measurement made during 1910 is believed not to be reliable. Discharge for January and February reduced by varying amounts to allow for effect of ice as indicated by the observer's notes; discharge interpolated between dates when gage was read.

Daily discharge, in second-feet, of Williamson River near Klamath Agency, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	567	371	600	1,040	567	293
2	567	371	690	990	567	288
3	561	371	770	980	544	283
4	554	371	860	980	544	278
5	548	371	950	970	544	273
6	541	371	1,040	960	544	268
7	535	365	1,120	960	544	268
8	528	359	1,200	950	544	268
9	522	353	1,270	950	522	268
10	498	347	1,350	940	522	268
11	473	341	1,430	900	500	268
12	449	335	1,510	860	500	268
13	424	329	1,590	820	477	268
14	399	329	1,560	782	477	249
15	375	329	1,540	752	477	249
16	350	329	1,510	752	477	249
17	340	329	1,490	752	392	249
18	330	329	1,460	752	350	230
19	319	329	1,440	752	268	230
20	309	329	1,410	659	288	230
21	298	344	1,390	636	413	230
22	293	359	1,360	659	350	230
23	288	374	1,340	636	350	230
24	300	389	1,310	636	308	230
25	312	404	1,280	590	308	230
26	323	419	1,260	613	308	230
27	335	434	1,240	590	268	.....
28	347	520	1,200	567	268	.....
29	359	.....	1,160	567	308	.....
30	371	.....	1,120	567	303	.....
31	371	.....	1,080	.....	298	.....

Monthly discharge of Williamson River near Klamath Agency, Oreg., for 1910.

[Drainage area, 840 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	567	288	412	0.491	0.57	25,300	C.
February	520	329	364	.433	.45	20,200	C.
March	1,590	600	1,240	1.48	1.71	76,200	C.
April	1,040	567	785	.935	1.04	46,700	B.
May	567	268	424	.505	.58	26,100	B.
June 1–26	293	230	255	.304	.29	13,200	B.
The period	.....	.....	.....	.....	.....	208,000	

LOST RIVER AT OLENE, OREG.

This station was originally established May 24, 1904, at the county bridge at Olene in sec. 14, T. 39 S., R. 10 E., and was maintained until July 30 of that year, when the bridge at which measurements were made was destroyed and the station was discontinued. It was reestablished May 20, 1907, and the records have been continuous since that date. This station replaces the one at Merrill, simultaneous

records being kept a sufficient length of time to make a comparison between the two. The difference of flow is largely accounted for by the inaccuracy of the data obtained at Merrill station.

A slough connecting Lost River with Klamath River joins Lost River 5 miles below the Olene station and Klamath River 2 miles below Lake Ewauna. Through this slough it is proposed to divert part of the waters from Lost River into Klamath River, and thus reclaim lands bordering Tule Lake. At present, however, the slough has been artificially closed and the flow has been shut off for several years. Before it was diked no water flowed except during high water, the direction depending upon whether Klamath or Lost River was the higher.

There is a small amount of inflow below Olene. One spring was measured April 14, 1908, giving a discharge of 2.9 second-feet, and during the irrigating season there is probably some waste water from irrigation. Nuss Lake is situated half a mile from the left bank of Lost River and 1 mile below Olene. It has no surface outlet except at flood time, but it is possible that a little water passes underground from this lake to the river during the summer months.

A hook gage has been used since April 23, 1909, in order to insure more accurate readings, the datum having remained the same.

Measurements are made from the highway bridge to which the gage is attached or at low water by wading. In defining the discharge curve the wading measurements have been given greater weight than low-water measurements at the bridge.

This station was maintained during 1910 by the United States Reclamation Service, but the tables of daily and monthly discharge were computed by the United States Geological Survey.

Discharge measurements of Lost River near Olene, Oreg., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 3[a]	L. Moser	35	61.6	4.45	90
Sept. 19[a]	....do	40	66.5	4.53	124
Dec. 7	....do	110	427	5.36	441
12	....do	140	836	8.22	2,610
13	....do	135	682	7.22	1,620

[a] Measured by wading.

Daily gage height, in feet, of Lost River at Olene, Oreg., for 1910.

[A. T. Wilson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.52	5.15	7.04	5.16	4.57	4.50	.....	4.45	4.47	4.50	4.51	4.77
2	4.50	5.10	9.06	5.14	4.57	4.49	.....	4.45	4.47	4.50	4.51	4.98
3	4.48	5.00	9.73	5.11	4.58	4.49	4.44	4.45	4.47	4.50	4.51	5.02
4	4.46	4.88	9.38	.....	4.59	4.49	4.44	4.45	4.47	4.50	4.51	5.74
5	4.45	4.70	8.46	5.18	4.60	4.48	4.44	4.42	4.47	4.50	4.51	6.22
6	4.44	4.60	7.66	5.04	4.62	4.48	4.44	4.35	4.47	4.50	4.51	5.62
7	4.42	4.62	7.12	4.98	4.66	4.48	4.44	4.35	4.47	4.50	4.51	5.36
8	4.42	4.66	6.77	4.93	4.69	4.48	4.44	4.35	4.47	4.50	4.52	5.39
9	4.41	4.64	6.53	4.90	4.68	4.48	4.44	4.37	4.47	4.50	4.52	5.36
10	4.40	4.64	6.46	4.87	4.66	4.48	4.42	4.38	4.47	4.50	4.52	6.17
11	4.40	4.65	6.42	4.84	4.64	4.48	4.42	4.40	4.47	4.50	4.52	7.52
12	4.40	4.64	6.40	4.82	4.64	4.48	4.42	4.40	4.48	4.50	4.52	8.73
13	4.40	4.68	6.38	4.80	4.60	4.48	4.42	4.40	4.53	4.50	.....	7.02
14	4.40	4.89	6.50	4.77	4.46	4.48	4.42	4.40	4.59	4.50	.....	6.02
15	4.40	5.06	6.50	4.74	4.44	4.48	4.42	4.41	4.58	4.50	.....	5.22
16	4.40	5.01	6.44	4.74	4.43	4.48	4.42	4.43	4.56	4.50	.....	5.22
17	4.40	4.92	6.34	4.72	4.50	4.48	4.42	4.44	4.52	4.50	.....	5.10
18	4.40	5.01	6.28	4.70	4.51	4.48	4.42	4.44	4.52	4.50	.....	4.98
19	4.39	5.06	6.22	4.68	4.51	4.48	4.42	4.44	4.52	4.50	.....	4.90
20	4.39	5.02	6.30	4.66	4.51	4.48	4.42	4.44	4.52	4.50	4.52	4.84
21	4.52	5.05	6.29	4.65	4.51	4.48	4.42	4.44	4.52	4.51	4.53	4.74
22	4.59	5.02	6.10	4.63	4.51	4.48	4.42	4.44	4.52	4.51	4.53	4.72
23	4.88	4.95	5.94	4.61	4.51	4.47	4.42	4.45	4.51	4.51	4.53	4.72
24	5.48	5.31	6.02	4.60	4.42	4.47	4.43	4.47	4.51	4.51	4.54	4.70
25	6.85	6.04	6.04	4.60	4.46	4.47	4.44	4.47	4.51	4.51	4.57	4.66
26	5.95	6.11	5.88	4.59	4.50	4.47	4.44	4.47	4.51	4.51	4.57	4.63
27	5.80	6.11	5.73	4.58	4.52	4.46	4.44	4.47	4.51	4.51	4.74	4.61
28	5.52	6.22	5.58	4.57	4.52	4.45	4.44	4.47	4.51	4.51	4.91	4.60
29	5.38	.....	5.42	4.56	4.52	4.44	4.45	4.47	4.50	4.51	4.85	4.60
30	5.31	.....	5.28	4.58	4.52	4.44	4.45	4.47	4.50	4.51	4.76	4.60
31	5.24	.....	5.21	.....	4.52	.....	4.40	4.47	.....	4.51	.....	4.60

NOTE.—No ice at this station.

Daily discharge, in second-feet, of Lost River at Olene, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	106	322	1,660	328	115	102	91	93	97	102	104	163
2	102	295	3,350	317	115	100	91	93	97	102	104	240
3	98	248	3,960	300	116	100	91	93	97	102	104	257
4	95	201	3,640	320	118	100	91	93	97	102	104	698
5	93	143	2,840	339	120	98	91	88	97	102	104	1,040
6	91	120	2,160	267	125	98	91	76	97	102	104	618
7	88	125	1,730	240	134	98	91	76	97	102	104	446
8	88	134	1,450	220	141	98	91	76	97	102	106	468
9	86	129	1,270	208	138	98	91	80	97	102	106	449
10	84	129	1,220	197	134	98	88	81	97	102	106	1,000
11	84	132	1,190	186	129	98	88	84	97	102	106	2,050
12	84	129	1,180	179	129	98	88	84	98	102	106	3,070
13	84	138	1,160	172	120	98	88	84	107	102	106	1,650
14	84	204	1,250	163	95	98	88	84	118	102	106	894
15	84	276	1,250	155	91	98	88	86	116	102	106	362
16	84	253	1,200	155	89	98	88	89	113	102	106	362
17	84	216	1,130	149	102	98	88	91	106	102	106	295
18	84	253	1,080	143	104	98	88	91	106	102	106	240
19	82	276	1,040	138	104	98	88	91	106	102	106	208
20	82	257	1,100	134	104	98	88	91	106	102	106	186
21	106	272	1,090	132	104	98	88	91	106	104	106	155
22	118	257	950	127	104	98	88	91	106	104	106	149
23	201	228	838	122	104	97	88	93	104	104	106	149
24	527	416	894	120	88	97	89	97	104	104	109	143
25	1,510	908	908	120	95	97	91	97	104	104	115	134
26	845	958	796	118	102	97	91	97	104	104	115	127
27	740	958	691	116	106	95	91	97	104	104	155	122
28	553	1,040	592	115	106	93	91	97	104	104	212	120
29	462	.....	488	113	106	91	93	97	102	104	190	120
30	416	.....	398	116	106	91	93	97	102	104	160	120
31	374	.....	356	.....	106	.....	84	97	.....	104	.....	120

NOTE.—Daily discharge determined from a rating curve fairly well defined between 100 and 2,500 second-feet.

Monthly discharge of Lost River at Olene, Oreg., for 1910.

[Drainage area, 1,290 [a] square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	1,510	82	246	0.191	0.22	15,100	B.
February	1,040	120	322	.250	.26	17,900	B.
March	3,960	356	1,380	1.07	1.23	84,800	B.
April	339	113	184	.143	.16	10,900	B.
May	141	88	111	.085	.10	6,820	B.
June	102	91	97.5	.076	.08	5,800	B.
July	93	84	89.5	.069	.08	5,500	B.
August	97	76	89.5	.069	.08	5,500	B.
September	118	97	103	.080	.09	6,130	B.
October	104	102	103	.080	.09	6,330	B.
November	212	104	116	.090	.10	6,900	B.
December	3,070	120	521	4.04	.47	32,000	B.
The year	3,960	76	282	.219	2.96	204,000	

[a] Including area above Clear Lake reservoir dam, 550 square miles, which strictly should be deducted, as no water was allowed to escape during 1910.

TULE LAKE NEAR MERRILL, OREG.

This station, which is located at J. F. Adam's ranch near the mouth of Lost River, in sec. 9, T. 41 S., R. 11 E., about 3 miles east of Merrill, was established May 17, 1904.

The elevation of the zero of the gage has been taken as 4,048.21 feet above sea level. When the station was established the gage was referred to a bench mark on a juniper post near by. The bench mark at that time was 13.7 feet above the zero of the gage. On October 21, 1904, this elevation was verified. On May 11, 1907, the elevation of the same bench mark was found to be 12.87 feet above zero of the gage, and was independently verified on June 11, 1907, and again on November 27, 1908. It appears, therefore, that sometime between October, 1904, and May, 1907, gage was raised 0.87 foot. This change was probably due to action of ice in the lake, although nothing of this kind has been observed since that time. Just when it occurred it has been impossible to ascertain, and a graph of the heights has failed to reveal any critical points that would account for a sudden change. It is therefore likely that the gage was raised a little at a time during the winters of 1905–6 and 1906–7.

On account of this error the gage heights prior to May, 1907, should not be used for refined studies.

The data for this station are furnished by the United States Reclamation Service.

Daily gage height, in feet, of Tule Lake near Merrill, Oreg., for 1910.

[J. F. Adams, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.95									6.50		
2				9.05			8.05					
3									6.80			6.70
4						8.50						
5		8.00	8.50								6.50	
6								7.50				
7					8.80							
8	7.95									6.50		
9				9.05			7.95					
10									6.70			6.80
11		8.00				8.40						
12			8.75								6.55	
13								7.40				
14					8.75							
15	7.95									6.55		
16				9.00			7.80					
17									6.65			6.90
18						8.30					6.60	
19		8.15	8.90									
20								7.20				
21					8.70							
22	7.95									6.55		
23				8.95			7.70					
24									6.50			7.00
25						8.10						
26		8.25	9.0								6.65	
27								7.00				
28					8.60							
29	7.95									6.50		
30				8.90			7.60					
31												7.00

NOTE.—The lake and lower Lost River were frozen from January 1 to about March 1. No ice noted in December.

MILLER CREEK NEAR LORELLA, OREG.

This station, which was established August 10, 1904, was originally located in sec. 13, T. 39 S., R. 13 E., at the lower end of Horsefly Valley. On April 1, 1909, it was moved to an old highway bridge in sec. 7, T. 40 S., R. 14 E., 3 miles south of Lorella post office and 1 mile east of the Swingle ranch in Langell Valley. All measurements in 1909 were referred to this gage. Both points are below all tributaries and the results should be comparable, although the drainage area at the lower station is 50 square miles greater than at the upper, the areas being 270 and 220 square miles, respectively.

A small amount of water is diverted for irrigation by a dam about one-fourth mile above the present station.

A vertical staff gage is attached to the bridge, and its datum has remained unchanged since the station was re-established. A Bristol self-recording pressure gage was installed May 2, 1909; the records obtained from it have been used during high water, but during low stages it was too much affected by temperature changes and the weekly readings of the staff gage have been used. The Bristol gage was replaced by a Friez recording gage on January 30, 1910, and since that time the gage heights have been fully reliable.

Discharge measurements are made from the highway bridge or by wading at low water.

During the winter months the river freezes over completely, and the data obtained at such periods are not reliable, but a large error during such periods is admissible without affecting the total annual flow. At flood stages, even during the winter, the relation between gage height and discharge is probably not affected by ice.

The conditions at the station during the open season are favorable for good results. A riffle that controls the flow just below the station seems to have shifted slightly during the spring flood of 1910.

High water measurements made 1911 indicate that the computed flood discharge of November, 1909, is considerably too small, but the yearly total is not materially affected thereby.

The 1911 measurements are published herewith, as they have been used in constructing the discharge rating curve.

This station was maintained during 1910 by the United States Reclamation Service, but the tables of daily and monthly discharge were computed by the United States Geological Survey.

Discharge measurements of Miller Creek near Lorella, Oreg., in 1910–11.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1910.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 2	Yadon and Moser			2.55	[a] 1.25
1911.					
Mar. 21	Leland Moser	65	576	6.40	990
21	....do	65	581	6.65	1,080
29	....do	65	665	7.55	1,800
31	....do	65	583	6.65	1,080
31	....do	75	746	8.05	2,160
Apr. 6	....do	65	602	6.65	1,110
16	....do	60	499	4.90	334
May 3	[b] ....do	40	58	3.90	88

[a] Discharge estimated. [b] Measured by wading.

Daily gage height, in feet, of Miller Creek near Lorella, Oreg., in 1910.

[M. L. Anderson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.20	3.95	8.50	4.24	2.85	2.95	2.66	2.60	2.65	2.70	2.81	4.30
2	2.40	3.75	7.10	4.10	2.96	2.95	2.70	2.60	2.65	2.69	2.81	5.35
3	2.40	3.56	6.70	4.02	3.12	2.94	2.70	2.60	2.60	2.68	2.82	6.40
4	2.20	3.20	7.00	3.95	3.22	2.80	2.70	2.60	2.60	2.78	2.82	5.52
5	2.40	3.00	6.80	3.85	3.18	2.78	2.70	2.60	2.60	2.79	2.81	4.90
6	2.60	3.08	6.40	3.76	3.06	2.78	2.70	2.58	2.61	2.78	2.81	4.50
7	2.50	3.08	6.10	3.65	2.98	2.77	2.70	2.59	2.62	2.75	2.82	4.10
8	2.50	3.08	6.05	3.56	2.89	2.75	2.70	2.60	2.62	2.73	2.92	6.00
9	2.00	3.08	6.10	3.50	2.78	2.74	2.70	2.61	2.62	2.70	2.88	6.20
10	1.80	3.08	6.10	3.45	2.72	2.71	2.70	2.63	2.61	2.70	2.87	7.05
11	1.80	3.15	6.15	3.45	2.65	2.70	2.70	2.64	2.61	2.70	2.89	5.25
12	2.00	3.18	6.20	3.50	2.59	2.70	2.65	2.66	2.62	2.78	2.90	4.30
13	2.30	3.70	6.10	3.37	2.48	2.70	2.65	2.68	2.63	2.80	2.89	4.10
14	2.30	3.42	6.10	3.25	2.35	2.70	2.62	2.69	2.66	2.79	2.88	4.02
15	2.10	3.38	6.00	3.15	2.28	2.72	2.62	2.70	2.70	2.78	2.86	3.95

Daily gage height, in feet, of Miller Creek near Lorella, Oreg., in 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	1.60	3.22	5.80	3.06	2.22	2.76	2.60	2.70	2.72	2.80	2.85	3.73
17	1.80	3.18	5.90	2.98	2.19	2.78	2.60	2.71	2.71	2.80	2.87	3.60
18	1.90	3.00	6.00	2.90	2.52	2.78	2.60	2.70	2.71	2.80	2.90	3.43
19	1.70	2.90	6.18	2.81	2.90	2.78	2.61	2.70	2.72	2.86	2.90	3.45
20	2.00	2.90	5.54	2.74	2.95	2.76	2.63	2.70	2.73	2.80	2.99	3.45
21	3.20	2.90	5.15	2.71	2.98	2.75	2.64	2.70	2.75	2.80	3.01	3.45
22	6.10	2.90	5.35	2.70	2.96	2.75	2.63	2.70	2.74	2.80	3.05	3.45
23	6.20	2.90	5.40	2.68	2.92	2.75	2.60	2.68	2.72	2.80	3.80	3.45
24	4.60	3.20	5.00	2.60	2.90	2.74	2.60	2.62	2.70	2.80	4.30	3.45
25	4.20	4.40	4.90	2.55	2.91	2.70	2.60	2.59	2.70	2.80	4.45	3.00
26	3.80	4.10	4.65	2.48	2.94	2.67	2.60	2.58	2.70	2.80	4.30	3.00
27	4.10	4.30	4.62	2.50	2.92	2.66	2.60	2.60	2.70	2.80	4.30	2.99
28	4.10	6.60	4.42	2.47	2.90	2.65	2.60	2.60	2.70	2.80	4.00	2.99
29	4.30	.....	4.22	2.52	2.88	2.65	2.60	2.60	2.70	2.80	4.18	2.98
30	4.20	.....	4.16	2.71	2.85	2.65	2.60	2.62	2.70	2.80	4.10	2.96
31	4.10	.....	4.15	.....	2.89	.....	2.60	2.64	.....	2.80	.....	2.80

NOTE.—Gage heights obtained from a Bristol automatic pressure gage until January 30, and from a Friez gage thereafter. The low readings for January 9 to 20 were probably caused by the low temperature and not by low stage of water. No ice noted; the creek freezes over at the bridge, but probably not at the riffle control, so that gage readings may not be materially affected.

The low water readings are not very accurate as the pen of the Friez gage was evidently set only to the nearest tenth of a foot.

Daily discharge, in second-feet, of Miller Creek near Lorella, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2	111	2,620	148	6	8	3	2	2	3	5	160
2	3	84	1,410	122	9	8	3	2	2	3	5	447
3	3	61	1,120	109	14	8	3	2	2	3	5	940
4	2	26	1,330	98	18	5	3	2	2	5	5	508
5	3	14	1,190	83	16	5	3	2	2	5	5	306
6	5	18	940	71	12	5	3	2	2	5	5	202
7	4	18	770	58	9	4	3	2	2	4	5	122
8	4	18	745	49	7	4	3	2	2	4	8	720
9	2	18	770	43	5	4	3	2	2	3	7	820
10	2	18	770	38	3	3	3	2	2	3	6	1,370
11	2	22	795	38	2	3	3	2	2	3	7	413
12	2	25	820	43	2	3	2	3	2	5	7	160
13	2	78	770	30	1	3	2	3	2	5	7	122
14	2	46	770	20	0	3	2	3	3	5	7	109
15	2	42	720	15	0	3	2	3	3	5	6	98
16	2	28	620	12	0	4	2	3	3	5	6	68
17	2	25	670	9	0	5	2	3	3	5	6	53
18	2	14	720	7	1	5	2	3	3	5	7	36
19	2	11	810	5	7	5	2	3	3	5	7	38
20	2	11	516	4	8	4	2	3	4	5	10	38
21	26	11	380	3	9	4	2	3	4	5	10	38
22	770	11	447	3	9	4	2	3	4	5	12	38
23	820	11	464	3	8	4	2	3	3	5	76	38
24	238	26	334	2	7	4	2	2	3	5	160	38
25	152	192	306	2	7	3	2	2	3	5	191	10
26	90	134	239	1	8	3	2	2	3	5	160	10
27	134	172	231	1	8	3	2	2	3	5	160	10
28	134	1,060	184	1	7	2	2	2	3	5	106	10
29	172	.....	144	1	7	2	2	2	3	5	136	9
30	152	.....	133	3	6	2	2	2	3	5	122	9
31	134	.....	131	.....	7	.....	2	2	.....	5	.....	5

NOTE.—Daily discharge determined from two fairly well-defined discharge rating curves based on 8 measurements made in 1909, 1 in 1910, and 8 in 1911. Low water records are poor on account of uncertain gage heights.

Monthly discharge of Miller Creek near Lorella, Oreg., for 1910.

[Drainage area, 270 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	820	2	92.6	0.343	0.40	5,690	C.
February	1,060	11	82.3	.305	.32	4,570	B.
March	2,620	131	705	2.61	3.01	43,300	A.
April	148	1	34.1	.126	.14	2,030	B.
May	18	0	6.5	.024	.03	400	C.
June	8	2	4.1	.015	.02	244	C.
July	3	2	2.4	.0089	.01	148	C.
August	3	2	2.4	.0089	.01	148	C.
September	4	2	2.7	.010	.01	161	C.
October	5	3	4.5	.017	.02	277	C.
November	191	5	42.0	.156	.17	2,500	B.
December	1,370	5	224	.830	.96	13,800	B.
The year	2,620	0	101	.374	5.10	73,300	

EAST FORK OF SCOTT RIVER NEAR CALLAHAN, CAL.

Scott River rises in the Scott Mountains in the southern part of Siskiyou County, and flows northwestward to its junction with Klamath River near Hamburg Bar. The length of the main river from the junction of the South and East forks near Callahan is about 50 miles. The basin is narrow and the tributaries are small. Scott Valley, extending from Fort Jones to French Gulch, is a rich agricultural valley. Below this valley the river enters a canyon in which it continues to its mouth.

The gaging station, which is located 500 feet west of W. Schneider's ranch house, 6 miles east of Callahan, in sec. 18., T. 40 N., R. 7 W., in the Shasta National Forest, was established November 1, 1910.

The gage is a vertical staff fastened to a willow tree on the left bank.

Discharge measurements are made from the foot log 30 feet below the gage.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of East Fork of Scott River near Callahan, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 13	W. V. Hardy	5	1.5	(*a*)	0.5
Nov. 23	F. G. Wood	12	8.0	3.22	14

a No gage installed.

NOTE.—Measurements made by wading below foot bridge.

Daily gage height, in feet, of East Fork of Scott River near Callahan, Cal., for 1910.

[F. P. Cunningham, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	2.95		11	3.1	3.7	21		
2	3.0	3.3	12			22		
3		3.4	13			23	3.2	
4	3.0	3.5	14			24	3.45	
5		3.4	15			25	3.3	
6		3.3	16			26	3.25	
7	3.0	3.25	17			27	3.25	
8		3.3	18			28		
9		3.5	19			29		
10	3.0	3.6	20			30		
						31		3.2

TRINITY RIVER NEAR TRINITY CENTER, CAL.

This station, which is located 500 feet below the highway bridge 2 miles southeast of Trinity Center, in the NE. ¼ sec. 16, T. 36 N., R. 7 W., in the Shasta National Forest, was established December 15, 1910.

Brush Creek enters about one-half mile and Coffee Creek about 6½ miles above the station. Swift Creek enters 1 mile below. The East Fork of Trinity River joins the main stream about three-fourths mile below the station.

The gage is a vertical staff on the right bank.

Discharge measurements are made from the bridge 500 feet above the gage.

A small amount of water, diverted from the North Fork of Swift Creek for placer mining, enters a short distance above the station. Otherwise the record at this point represents the natural run-off from this drainage area.

This station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by F. G. Wood, from bridge. December 15, 1910:

Width, 134 feet; area, 151 square feet; gage height, 3.47 feet; discharge, 509 second feet.

Daily gage height of Trinity River near Trinity Center, Cal., for 1910.

[Fred Hansen, observer.]

	Feet.		Feet.
Dec. 15	3.47	24	....
16	3.3	25	....
17	....	26	3.05
18	....	27	....
19	3.2	28	3.0
20	....	29	....
21	3.2	30	2.9
22	....	31	2.9
23	3.2		

COFFEE CREEK AT COFFEE, CAL.

This station, which is located at a private bridge at Coffee, 6 miles above the mouth of the Creek, in the NW. ¼ sec. 4, T. 37 N., R. 8 W., in the Shasta National Forest, was established December 16, 1910. Boulder Creek enters 400 feet above and Little Boulder Creek 1¼ miles below the station.

The gage is a vertical staff on the right support of the bridge.

Discharge measurements are made from the bridge.

This stream is utilized by the Trinity Gold Mining & Reduction Co. to operate the mine near Carrville. At certain times of the year the operation of two "self-shooter" dams above the station may affect the accuracy of the records. Each of these dams is controlled by a gate which opens when the desired head is reached. As soon as the reservoir is emptied, (the larger one in about half an hour) the gate closes automatically. These dams are used in connection with the placer mining.

This station is maintained in cooperation with the U. S. Forest Service.

The following discharge measurement was made by F. G. Wood. December 16, 1910:

Width, 41 feet; area, 148 square feet; gage height, 4.17 feet; discharge, 176 second feet.

Daily gage height of Coffee Creek at Coffee, Cal., for 1910.

[F. H. Williams, observer.]

	Feet.		Feet.
Dec. 16	4.17	Dec. 24	3.87
17	4.15	25	3.86
18	4.15	26	3.86
19	4.00	27	3.84
20	3.92	28	3.82
21	3.90	29	3.80
22	3.88	30	3.78
23	3.87	31	3.75

EAST FORK OF TRINITY RIVER NEAR TRINITY CENTER, CAL.

This station, which is located at the highway bridge 3 miles southeast of Trinity Center and one-fourth mile above the junction with Trinity River, in the SW. ¼ sec. 15, T. 36 N., R. 7 W., in the Shasta National Forest, was established December 15, 1910.

The gage is a vertical staff on the downstream end of the left abutment of the bridge.

Discharge measurements are made from the bridge.

The water of this stream is used to irrigate about 425 acres of land. The principal diversion canal, that belonging to the Trinity Farm & Cattle Co., heads about 4 miles above the station.

This station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by F. G. Wood. December 15, 1910:

Width, 50 feet; area, 144 square feet; gage height, 4.77 feet; discharge, 238 second feet.

Daily gage height of East Fork of Trinity River near Trinity Center, Cal., for 1910.

[Fred Hansen, observer.]

	Feet.		Feet.
Dec. 15	4.77	Dec. 24	....
16	....	25	....
17	4.5	26	4.0
18	....	27	....
19	4.3	28	4.0
20	....	29	....
21	4.2	30	4.05
22	....	31	4.0
23	4.15		

SWIFT CREEK NEAR TRINITY CENTER, CAL.

This station, which is located one-fourth mile above the mouth of the North Fork of Swift Creek, 2½ miles south of Trinity Center, in the E. ½ sec. 13, T. 36 N., R. 8 W., in the Shasta National Forest, was established December 17, 1910.

No water is diverted above the station. Water is diverted below for placer mining in the vicinity of Trinity Center.

The gage is a vertical staff fastened to a cedar tree on the left bank.

Discharge measurements are made from a foot log 100 feet above the gage.

This station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by F. G. Wood from foot log 100 feet above gage:

December 17, 1910: Width, 48 feet; area, 63 square feet; gage height, 2.09 feet; discharge, 133 second feet.

Daily gage height of Swift Creek near Trinity Center, Cal., for 1910.

[Fred Hansen, observer.]

	Feet.		Feet.
Dec. 17	2.09	Dec. 25	
18		26	
19		27	1.7
20	2.0	28	
21		29	1.7
22	1.9	30	
23		31	1.65
24	1.9		

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous discharge measurements have been made on streams of the Pacific coast in California during 1910. They are arranged in the same order of drainage basins as the regular stations:

Miscellaneous discharge measurements in south Pacific Ocean drainage basins in 1910.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Oct. 11	Cajon Creek	Santa Ana River	Below junction with Lone Pine Creek and above diversion of Muscoy Water Co. to Glen Helen Farm. Near north line of sec. 13, T. 2 N., R. 6 W.	.....	4.8
June 20	West Fork of San Gabriel River.	San Gabriel River.	At weir 100 feet above junction with North Fork.	.....	8.5
20	North Fork of West Fork of San Gabriel River.	.....do.....	At weir about 500 feet above mouth.	.....	7.2
Apr. 7	Arroyo Seco	Los Angeles River.	At mouth of Millard Canyon, 4 miles north of Pasadena, Cal.	.....	7.7
June 6	.....do.....	.....do.....	In flume at intake North Pasadena Land & Water Co. Includes total flow of stream.	.....	2.0
28	.....do.....	.....do.....	In flume at intake of North Pasadena Land & Water Co. Includes total flow of Arroyo Seco above Millard Canyon. No water flowing from Millard Canyon into the Arroyo Seco.	.....	1.2

Miscellaneous discharge measurements in San Joaquin River drainage basin in 1910.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Oct. 5[a]	Kern River Power Canal.	Diverts from Kern River.	At Isabella, Cal.	4.16	2.28
Nov. 21[b]	.....do.....	.....do.....	.....do.....	4.38	2.52
Sept. 20	North Fork of Kings River.	Kings River	Wading 100 feet above gage, 19 miles east, and 6 miles south of Ockenden, Cal.	4.0	1.7
Oct. 9	Bear Creek	Tule River	At mouth near Daunt, Cal.	.....	c.2
Aug. 20	Tule ditch	Diverts from Tule River.	Opposite gaging station on Tule River near McFarland's ranch.	.....	1.6
Nov. 6	South Fork of Merced River.	Merced River	Below junction of Big Creek.	.....	20
6	.....do.....	.....do.....	Above junction of Big Creek.	.....	10
Aug. 25[d]	Tuolumne River	San Joaquin River.	Foot bridge, head of Hetch Hetchy Valley.	[e] 1.00	105
25[d]	.....do.....	.....do.....	Dam site in Hetch Hetchy Valley	.....	115
Sept. 13	.....do.....	.....do.....	Wading 1 mile below Lumden's Bridge, about 50 feet above mouth of South Fork of Tuolumne River.	.....	46
Aug. 24[d]	Piute Creek	Tuolumne River	Footbridge head of Pleasant Valley	[f] .32	3.2
26[d]	Outlet of Lake Eleanor.	.....	Sack dam	.....	2.6
26[d]	Eleanor Creek	.....do.....	½ mile below outlet of Lake Eleanor.	.....	3.8
Sept. 8	Stanislaus River	San Joaquin River.	Wading 200 feet above power house No. 9, Stanislaus Electric Power Co., below mouth of North Fork of Stanislaus River.	.....	13
Oct. 25	.....do.....	.....do.....	.....do.....	.....	24

[a] From data furnished by Kern River Power Co.
[b] Soundings considered unreliable because of light weight used and high velocities encountered
[c] Estimated.
[d] Made by R. D. Robertson, United States irrigation investigations.
[e] Gage nailed on bent of bridge.
[f] Gage is a quaking aspen nailed to bent of bridge.

Miscellaneous discharge measurements in Sacramento River drainage basin in 1910.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.ft.*
Oct. 9	Sacramento River.	San Francisco Bay.	Upstream side of steel bridge on wagon road from Sisson, Cal., to Brown's ranch; sec. 29, T. 4 N., R. 4 W.	.....	11
9	Wagon Creek.....	Sacramento River.	At logging road trestle; wagon road from Sisson, Cal., to Brown's ranch; sec. 29, T. 40 N., R. 4 W.	.....	38
Sept. 23	Pit River.....	.....do.....	At bridge, 300 feet south of Pittville; sec. 18, T. 37 N., R. 6. E.	.....	31
24	.....do.....	.....do.....	At Pecks bridge, near Cayton, Cal.; sec. 21, T. 37 N., R. 3 E.	.....	2,770
23	Fall River.....	Pit River.....	At wagon bridge, upstream side, near Fall River Mills; sec. 31, T. 37 N., R. 4 E.	.....	1,470
22	Hat Creek.....	.....do.....	At bridge near Carbon, Cal., sec. 20, T. 36 N., R. 4 E.	.....	701
21	Rising River.....	Hat Creek.....	At bridge, road from Hat Creek to Cassel, near Cassel post office; sec. 8, T. 35 N., R. 4 E.	.....	421
25	Burney Creek.....	Pit River.....	Wading, 1½ miles above Burney post office; sec. 26, T. 35 N., R. 2 E.	.....	20
25	.....do.....	.....do.....	Log footbridge below falls and near junction with Pit River; sec. 29, T. 37 N., R. 3 E.	.....	246
23	Cayton Creek.....	.....do.....	Wading, 20 feet above bridge on wagon road from Fall River to Pecks Bridge near Cayton Valley; sec. 15, T. 37 N., R. 3 E.	.....	4.6
24	Clark Creek.....	.....do.....	Wading, near mouth, near Pecks Bridge; sec. 19, T. 37 N., R. 3 E.	.....	8.9
27	Nelson Creek.....	.....do.....	At wagon bridge about ½ mile above junction with Pit River, near Henderson, Cal.; sec. 31, T. 37 N., R. 1 E.	.....	23
27	Baker Creek.....	Kosk Creek.....	Wading, ½ mile east of ranger's camp near Henderson, Cal.; sec. 24, T. 37 N., R. 1 W.	.....	16
25	Hatchet Creek.....	Pit River.....	Downstream side bridge on road from Burney to Montgomery Creek, Cal., about 7 miles from latter; sec. 19, T. 35 N., R. 1 E.	.....	19
26	Hatchet Creek.....	Pit River.....	Downstream side bridge on Cove road from Montgomery Creek to Henderson, Cal.; sec. 24, T. 35 N., R. 1 W.	.....	37
26	Roaring Creek.....	Hatchet Creek....	At bridge on Cove road from Montgomery to Henderson, Cal., near Montgomery Creek; sec. 14, T. 35 N., R. 1 W.	.....	15
26	Montgomery Creek.	Pit River.....	Downstream side wagon bridge south of hotel, Montgomery Creek post office, Cal.; sec. 36, T. 35 N., R. 1 W.	.....	22
Oct. 16	Squaw Creek.....	.....do.....	At footbridge at Copper City, Ydalpom post office; sec. 28, T. 34 N., R. 3 W.	.....	19
Nov. 17	.....do.....	.....do.....	At footbridge, ½ mile southwest of Copper City, Ydalpom post office; sec. 29, T. 34 N., R. 3 W.	2.08	23
Oct. 3	Cow Creek.....	Sacramento River.	Downstream side bridge at Millville, Cal.; sec. 14, T. 31 N., R. 3 W.	.....	65
Sept. 19	North Fork of Cow Creek.	Cow Creek.....	Wading, 150 feet above wagon bridge, about 11 miles northeast of Millville, Cal., on Tamarack road, above diversion of irrigation ditch, near section line between secs. 16 and 21, T. 32 N., R. 1 W.	.....	42
20	Old Cow Creek....	South Fork of Cow Creek.	Wading, 50 feet above Tamarack road crossing near Whitman, Cal.; sec. 27, T. 33 N., R. 2 E.	.....	4.5
Oct. 3	Clover Creek.....	Cow Creek.....	Wading, 300 feet above bridge on road from Millville to Palo Cedro, near Millville, Cal.; sec. 10, T. 31 N., R. 3 W.	.....	9.0
3	Oak Run Creek....	.....do.....	Wading, ½ mile above bridge on road from Millville to Palo Cedro, near Millville, Cal.; sec. 3, T. 31 N., R. 3 W.	.....	2.2

Miscellaneous discharge measurements in Sacramento River drainage basin in 1910—Con.

Date.	Stream.	Tributary to—	Locality.	Gate height.	Discharge.
				Feet.	*Sec.ft.*
Oct. 2	Little Cow Creek	Cow Creek	Wading, 200 feet above hotel near Ingot, Cal.; sec. 1, T. 33 N., R. 2 W.		12
3	do	do	Wading, 80 feet below bridge, 1¼ miles east of Palo Cedro, Cal.; sec. 5, T. 31 N., R. 3 W.		13
Sept. 19	Bear Creek	Sacramento River.	At bridge on county road between Balls Ferry and Millville, Cal.; sec. 15, T. 30 N., R. 3 W.		45
Oct. 3	do	do	do		38
Sept. 18	Battle Creek	do	Wading, at ford 1½ miles below lower power plant, Northern California Power Co., near Balls Ferry, Cal.; sec. 1, T. 29 N., R. 3 W.		396
Oct. 4	do	do	do		405
Sept. 17	Antelope Creek	do	Wading, ⅛ mile above diversion dam of Red Bluff city waterworks, about 10 miles east of Red Bluff, Cal.		56
12	Deer Creek	do	At sheep bridge, about 8 miles northeast of Vina, Cal., near mouth of canyon; sec. 23, T. 25 N., R. 1 W.		116
29	North Fork of Feather River.	Feather River	½ mile above Ganzners		766
21	Indian Creek	North Fork of Feather River.	400 feet below old Government gage (near Crescent Mills), at outlet of valley.	1.30	67
23	East Branch of Feather River (Indian Creek).	do	At ford near mouth		212
23	do	do	150 yards above mouth		224
20	do	do	At mouth		204
21	Spanish Creek	Indian Creek	At Pocket, Cal., 50 yards above bridge.		41
22	Mill Creek	Spanish Creek	25 feet above wagon bridge		9
23	Yellow Creek	North Fork of Feather River.	At trail crossing, 150 yards above mouth.		106
24	Chip Creek	do	At mouth		22
24	Milk Ranch Creek	do	100 feet below wagon bridge		5
24	Bucks Creek	do	100 yards above mouth		19
25	Rock Creek	do	Mouth		5.5
26	Grizzly Creek	do	200 feet above mouth		18
25	Camp Creek	do	At wagon bridge		5
27	French Creek	do	1,000 feet above railroad bridge		28
27	Berry Creek	do	60 feet above mouth		5
20	Middle Fork of Feather River.	do	Opposite Langhorst's		64
Oct. 3	do	do	½ mile above Little North Fork		184
4	do	do	200 feet above Western Pacific Railroad bridge.		230
Sept. 18	do	do	Bidwells Bar, Cal		439
20	Nelson Creek	Middle Fork of Feather River.	50 yards above wagon bridge		51
Oct. 3	Little North Fork	do	At mouth		23
Sept. 19	South Fork of Feather River.	do	At Little Grass Valley		3
18	do	do	At Enterprise, Cal		13
18	Palermo Land & Water Co.'s canal.	Diverts from South Fork of Feather River.	do		34
16	North Fork of Yuba River.	Middle Fork of Yuba River	At bridge at Downieville, Cal	(a)	b421
12	do	do	Wading, at Bullards Bar, Cal		195
Dec. 9	Davis Ditch	Diverts from North Fork of Yuba River.	Near power house at Downieville, Cal.		3.5
Sept. 14	Rock Creek	North Fork of Yuba River.	Wading, above footbridge below junction of Woodruff Creek near Goodyear Bar, Cal.		.8
Oct. 31	Woodruff Creek	do	Wading, about 50 feet above mouth, near Goodyear Bar, Cal.		.7
Sept. 14	Goodyear Creek	do	Wading, at Goodyear Bar, Cal	(c)	d7.1
Oct. 28	Willow Creek	do	Mouth, at Bullards Bar, Cal		e4
28	Little Oregon Creek.	do	do		e2.5

a Water surface 17.37 feet below center of spike head, upstream side of bridge, near right bank.
b For sections over 6 feet in depth subsurface method used, reduction coefficient 0.85.
c Water surface 15.97 feet below bottom of notch cut in top of guard-fence rail of bridge, upstream side, 15 feet from right bank.
d Included 0.6 second-foot discharge in irrigating ditch diverting from Goodyear Creek, ¾ mile above point of measurement.
e Estimated.

Miscellaneous discharge measurements in Sacramento River drainage basin in 1910—Con.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec. ft.*
Sept. 12	Middle Fork of Yuba River.	Yuba River.....	Wading, 300 feet above bridge at Freemans Crossing, near North San Juan, Cal.	.....	41
10	South Fork of Yuba River.	.....do.....	Wading, just below wagon bridge, at Washington, Cal.	.....	41
Oct. 24	South Fork of American River.	American River...	Wading, 1 mile northwest of Pacific, Cal.	.....	11

NOTE.—Miscellaneous measurements made on the North, Middle, and South forks of Feather River and their tributaries as given above are published as furnished by outside parties.

Miscellaneous discharge measurements in north Pacific Ocean drainage basins in California in 1910.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec. ft.*
Aug. 11	Russian River.....	Pacific Ocean.....	At wagon bridge 1 mile north of Calpella, Cal.	.....	0.7
11	.....do.....	.....do.....	At bridge at Cloverdale, Cal.....	.....	[a]6.6
11	East Fork of Russian River.	Russian River....	Wading at mouth, 3 miles north from Ukiah, Cal.	.....	[b]3.5
15	Eel River.....	Pacific Ocean.....	Wading at Dyerville, Cal., ½ mile above junction of South Fork of Eel River; sec. 26, T. 1 S., R. 2 E., H. M.	.....	28
14	South Eel River...	Eel River.....	Wading 500 feet above junction with Middle Fork of Eel River; sec. 31, T. 22 N., R. 13 W., M. D. M.	.....	5.3
14	Middle Fork of Eel River.	South Eel River..	Wading above junction with South Eel River; sec. 31, T. 22 N., R. 13 W., M. D. M.	.....	8.3
Sept. 5	South Fork of Eel River.	Eel River.....	Wading 300 feet below bridge, 1 mile south of Garberville, Cal.	.....	38
Aug. 15	.....do.....	.....do.....	Wading 500 feet above mouth at Dyerville, Cal.; sec. 26, T. 1 S., R. 2 E., H. M.	.....	36
16	Van Duzen River.	.....do.....	Wading 200 feet below bridge ½ mile south of Alton, Cal.; sec. 23, T. 2 N., R. 1 W., H. M.	.....	5.1
Sept. 2	Redwood Creek....	Pacific Ocean.....	Wading 300 feet below bridge at Orick, Cal.; sec. 4, T. 10 N., R. 1 E., H. M.	.....	6.9
Aug. 26	Klamath River....	.....do.....	Wading 300 feet above Martins Ferry below Weitchpec, Cal.; sec. 5, T. 9 N., R. 4 E., H. M.	.....	2,350
8	Barclay Springs...	Upper Klamath Lake.	.....	.....	1.7
10	Cream Creek.....	.....do.....	Near Sevenmile Creek.....	.....	12.3
10	Cherry Creek.....	.....do.....	Odessa road.....	.....	10
10	Sevenmile Creek...	.....do.....	Looseley ranch.....	.....	82
11	Rock Creek.....	.....do.....	5 miles southeast of Odessa.....	.....	13
Sept. 24	.....do.....	.....do.....	Pelican Bay.....	.....	7.3
24	Jones Creek.....	.....do.....	.....do.....	.....	2.5
Aug. 10	Wood River.....	.....do.....	Fort Klamath.....	.....	339
11	Fort Creek.....	Wood River.....	.....do.....	.....	120
10	Crooked Creek....	.....do.....	Klamath Agency.....	.....	110
July 26	Cottonwood Creek.	Lower Klamath Lake.	"JF" ranch.....	.....	2
Sept. 20	.....do.....	.....do.....	.....do.....	.....	16
July 26	Willow Creek.....	.....do.....	Davis school.....	.....	9.7
Sept. 21	.....do.....	.....do.....	.....do.....	.....	16
20	Sheepy Creek.....	.....do.....	Lower marsh.....	.....	35
Oct. 12	Scott River.....	Klamath River...	300 feet below wagon bridge, 1 mile below Callahan, Cal.	.....	21
Nov. 22	.....do.....	.....do.....	.....do.....	[c]	63
Dec. 19	Trinity River.....	.....do.....	At highway bridge at Lewiston, Cal.; NE. ¼ sec. 19, T. 33 N., R. 8 W., M. D. M.	[d]3.62	782

[a] All water in Russian River, this date, coming from East Fork. Water standing in pools in West Fork at junction.

[b] Water surface 14.55 feet below top of steel chord at second vertical from right abutment, upstream side.

[c] Gage height reduced to same datum as gage installed Aug. 28, 1911.

Miscellaneous discharge measurements in north Pacific Ocean drainage basins in California in 1910—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec. ft.*
Aug. 24	Trinity River	Klamath River	Wading 50 feet above junction with South Fork of Trinity River; sec. 14, T. 6 N., R. 5 E., H. M.	.....	275
22	....do....	....do....	Wading ½ mile below ferry at Hoopa, Cal., in Indian reservation.	.....	345
Dec. 17	Trinity Gold Mine & Reduction Co.'s flume.	Diverts from Coffee Creek.	In flume, 100 feet above fore bay and below last waste; near Carrville, Cal.	.....	34
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